PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE

REPORT

OF THE

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE

VOLUME I.

CALCUTTA
SUPERINTENDENT GOVERNMENT PRINTING, INDIA
1917.

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE.

VOLUME I.

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REPORT

OF THE

PUBLIC WORKS DEPARTMENT REORGANIZATION COMMITTEE.

CHAPTER I.

GENERAL.

Appointment of the committee and terms of reference.

1. The committee was appointed by the Governor General in Council by Public Works Department Resolution No. 06-E.A., dated the 24th November 1916, the first two paragraphs of which are reproduced below :—

"The Governor General in Council has recently considered the organization, methods and procedure of the Buildings and Roads Branch of the Public Works Department with the object of deciding whether it can be improved and rendered more economical and efficient. Whilst the Governor General in Council desires to recognise the great services of the Public Works Department in the past, and the important part that it has taken in the development of India, a recognition with which the Secretary of State desires fully to associate himself, there is a considerable body of opinion that the changing conditions make it desirable to reconsider the methods under which Public Works are carried out and more particularly to secure, if and whenever this is possible, the substitution of private for departmental agency. It is urged that much of the work at present carried out by the Public Works Department could be entrusted to private agency, and that greater economy could thus be secured, and further that much greater use might be made by Government of local bodies, some of which at present employ a skilled public works agency. Much work of a simple and unimportant character which is now undertaken and supervised by highly salaried officers of Government could, it has been suggested, be carried out at reduced cost under contract subject to Government inspection. In the second place, it is urged that, if local bodies are encouraged and enabled to arrange more extensively than at present for the execution by their own staff or by private agency of their works, it will not only be a further step in the direction of decentralization but also would stimulate the growth of firms of standing in the building and allied trades and so encourage further industrial activity. Such development will, further, tend automatically to react upon the educational system of the country. A demand for more highly trained engineers in private employ would involve the provision of facilities for the best possible training at the Engineering Colleges. And it is considered that such provision must be an integral factor in any schemes for the development of private enterprise such as would be connoted in changes of the kind in view.

"For the purpose of examining these matters the Governor General in Council has accordingly determined, with the approval of the Secretary of State, to appoint a Committee whose duty it will be to inquire into and report generally upon the organization and the system

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NOTE.—The figures in the margin refer to the serial numbers in the index to the evidence on subjects dealt with in the report at pages 115 to 122 of this volume.

of administration of the Buildings and Roads Branch of the Public Works Department, with special reference to the considerations advanced in the foregoing paragraph, and to make such suggestions for change as the circumstances seem to justify. Among the particular points which the Committee should inquire into are the following:—

"(i) whether the methods at present adopted for the execution of civil works are economical and suitable for the purpose for which they were devised;

"(ii) whether under the existing system private enterprise is sufficiently encouraged, and whether it is possible and desirable to entrust the construction and upkeep of certain classes of public works to agency other than departmental, and if so, upon what lines such change should be effected;

"(iii) whether any changes recommended by the Committee necessitate any modification of the organization of the staff of the Public Works Department, and, if so, what;

"(iv) whether the Public Works Department meets the needs of other Departments of the Administration, and whether the relations *inter se* of the various subdivisions of the Buildings and Roads Branch, Sanitary, Architectural, Electrical and Civil Engineering, are satisfactory;

"(v) whether further decentralization within the Public Works Department itself is desirable, and, if so, to what extent and in what directions;

"(vi) whether the Public Works Department Code which regulates the execution and maintenance of civil works is unduly restrictive, and, if so, in what direction change is desirable;

"(vii) whether the system of education in Government Engineering Colleges is organised on a sufficiently broad basis to meet the needs of private agency as well as of Government, whether it attracts suitable candidates and whether the standard of instruction is sufficiently advanced to provide fully qualified civil engineers for employment by Government, local bodies, and private engineering and contracting firms, and, if not, in what directions and to what extent improvement is required;

"(viii) whether adequate provision is made for the practical training on works of students who have received their scientific education in English or Indian Colleges."

Constitution of the committee.

2. The committee was composed of the following members, appointed by the Governor General in Council:—

F. G. Sly, Esq., C.S.I., I.C.S. (President), Commissioner, Nagpur Division, Central Provinces.

Sir Noel Thomas Kershaw, K.C.B., Local Government Board, England.

C. S. Cobb, Esq., M.V.O., lately Chairman of the London County Council.

Rai Bahadur Lala Ganga Ram, C.I.E., M.V.O., late of the Public Works Department, Punjab.

A. T. Mackenzie, Esq., late of the Public Works Department, Madras.

Mr. D. G. Harris, Under Secretary to the Government of India, Public Works Department, was appointed our secretary.

Chapter III—Additional requirements and methods of recruitment of officers of State Administrative Services.

Chapter IV—Systems of training of officers of State Administrative Services.

Summary of recommendations and conclusions (Part I).

Part II: Problems of District Administration:

Chapter V—Problems of development at the village, block and district levels.

Chapter VI—Panchayati Raj legislation and progress in establishment.

Chapter VII—The role of administrative and technical services under Panchayati Raj.

Chapter VIII—Urban bodies and Panchayati Raj institutions; and other special problems.

Summary of recommendations and conclusions (Part II.)

Much detailed information is available in the memoranda to which I have referred and in the minutes of the discussions. In this report, an attempt is made to bring out the broad issues that arise and the conclusions reached.

NEW DELHI;
August 17, 1962.

V. T. KRISHNAMACHARI.

सत्यमेव जयते

We also desire to express our great obligations to Mr. D. G. Harris, our secretary, for the efficient manner in which he has performed his important duties. His professional knowledge, his intimate acquaintance with the organization of the department, and his devotion to duty have been of the greatest assistance to us throughout our inquiry.

CHAPTER II.

HISTORY AND PRESENT ORGANIZATION OF THE PUBLIC WORKS DEPARTMENT.

History of the public works department.

4. The public works department was first organized on a definite basis in 1854 in succession to the old military boards of the three presidencies, constituted mainly for the purpose of carrying out military works, and traces 58(i). of this military origin can still be found in some of the present methods of the department. At that date the staff of engineers was drawn from various sources, including the Thomason civil engineering college at Roorkee, which had been founded in 1847 primarily with the object of imparting a civil engineer's education to European and Indian officers and subordinates to fit them for employment on the Ganges canal, which was then under construction. In 1866, in order to meet the increasing demand for public works, three separate branches were formed, the military works branch, the civil works branch including irrigation, and the railway branch, and to these was added in 1870 the public works accounts branch. In 1893, in accordance with the recommendation of the Aitchison Commission on the Indian public services, the provincial service was created for the purpose of providing for the more extensive employment of Indians from the engineering colleges in India. By 1895 the public works department had become a purely civil department by the separation of the military works branch, and in 1905 the railway branch was formed into a separate department on its present basis. Since that date the public works department has been responsible only for civil works including irrigation. During the same period, with the development of local self-government, certain classes of public works have been entrusted, to an extent varying in different provinces, to the control of district boards and municipalities. In 1910 the public works accounts branch was abolished as a separate entity and merged in the civil accounts department.

Personnel of the department.

5. The personnel of the engineering branch of the public works department is divided into three establishments, the engineer establishment, the upper subordinate establishment and the lower subordinate establishment. The engineer establishment is again sub-divided into two services—the imperial and the provincial. The strength of the imperial service of engineers is maintained by the annual appointment by the Secretary of State in England of a varying number of selected candidates, by the appointment in India of Royal Engineer officers, and by the occasional admission of other qualified persons. The provincial service of engineers is open only to statutory natives of India, and its strength is maintained by the appointment annually of a fixed number of qualified students from the Indian engineering colleges, by the promotion of a fixed number of selected upper subordi-

nates of the department, and by the occasional admission of other qualified persons. There is no distinction between the members of the imperial and provincial services except in regard to pay, leave and pension, and the combined establishment is divided into the following classes :—

Designation.	Rate of present monthly pay.	
	Imperial.	Provincial.
	Rs.	Rs.
Chief engineer	2,500—2,750	
Superintending engineer . .	1,500—2,000	1,200—1,600
Executive engineer . . .	800--1,250	535—850
Assistant engineer . . .	380—750	250—475

The Public Services Commission has recommended the amalgamation of the two services into a single superior engineering service and has proposed, for officers recruited in India, scales of pay of Rs. 300—550 for assistant engineers and Rs. 600—1,050 for executive engineers, and for all officers holding the rank of superintending engineer irrespective of the place of recruitment the same pay of Rs. 1,500—2,000.

Public Services Commission Report, Annexure XVIII, paras. 7 and 20.

The upper subordinate establishment is recruited by the appointment of passed students of the Indian engineering colleges to which a certain number of appointments annually are guaranteed, including non-commissioned officers and soldiers of His Majesty's army in India, by the promotion of selected lower subordinates and by the appointment of other suitable candidates. This establishment is divided into three classes, designated respectively sub-engineers, supervisors, and overseers. The pay of each class is fixed by the local Governments, subject to a maximum salary of Rs. 550 per mensem ; in general it varies from about Rs. 60 as a minimum to Rs. 550 as a maximum.

The lower subordinate establishment is maintained at the required strength by the appointment of students holding certificates from the engineering colleges, and of other suitable candidates. The members of this establishment are designated sub-overseers, and their pay is fixed by the local Governments, varying generally from about Rs. 30 as a minimum to Rs. 100 as a maximum.

In addition to the permanent staff of the department, officers with the same designations, but engaged as temporary establishment, on a purely temporary and non-pensionable basis, are employed in every class of the establishment, the extent to which such temporary establishment is employed varying from time to time with the excess of work in progress beyond the capacity of the permanent staff.

All major local Governments also employ a certain number of specialist officers who undertake duties which, while falling to the lot of the department, are regarded as outside the scope of the work of a civil engineer. These specialist officers include consulting architects, sanitary engineers and electrical engineers, and in some provinces mechanical engineers, plumbing experts, boiler inspectors, workshop superintendents, etc. In a few cases these officers are employed permanently, but usually they are engaged on short-term covenants with special conditions of service applicable to each.

Further, an executive Engineer may entertain the necessary temporary works establishment for the construction of any work duly sanctioned, the pay of which establishment is charged direct to the work concerned. The main conditions attached to the entertainment of this class of establishment are that the persons must be employed for the subordinate supervision of stores or labour, must be paid by the day or month, their employment ceasing with the cessation of the work, and the rate of pay must in no case exceed Rs. 250 a month.

Scope of the operations of the public works department.

6. The magnitude of the operations of the buildings and roads branch of the public works department may be gauged from the statement below which shows, for each of the major provinces, the average annual expenditure during the three years prior to the war from 1911-12 to 1913-14 on works executed by this branch and on the establishment employed thereon. The details of this expenditure are shown in Statement I attached to this report.

Province.	Works.	Establishment.
	Rs.	Rs.
Madras	64,14,458	13,50,785
Bombay	1,10,43,563	16,50,455
Bengal	68,72,845	11,44,924
United Provinces . . .	93,04,855	14,64,570
Punjab	63,13,014	9,53,858
Burma	95,90,949	22,74,270
Bihar and Orissa . . .	47,08,788	7,49,239
Central Provinces . . .	58,78,718	10,05,844
Assam	38,67,630	6,81,283
TOTAL .	6,39,94,820	1,12,75,228

The following are the main heads under which the expenditure on works is classified :—

Provincial civil works include all works the cost of which is met from the current revenues of the province concerned, and comprise, in general, the main lines of communication and all buildings required in connection with provincial administration, such as office buildings, courts of justice, police stations, barracks and offices, government schools and colleges, hospitals and the like.

Imperial civil works consist mainly, in the major provinces, of the construction and maintenance of buildings for the use of departments directly administered by the Government of India, such as post and telegraph offices and customs houses.

Military works are usually executed by officers of the military works services, but in all provinces, and especially in localities where no military engineer is available, a certain amount of such work is entrusted to the public works department.

Local fund works include expenditure on the works of district boards executed through the agency of the public works department, and vary greatly in amount in the different provinces, according to the capacity of the engineering establishment employed by each district board.

Contribution works.—The department may, at the discretion of the local Government concerned, be called upon to undertake works for which the outlay is provided wholly or in part from funds of a public nature, but not included in the financial estimates and accounts of the empire, or from contributions from the public. In this category fall works such as a town hall or reservoir for a municipality, a school or hospital for which funds have been raised by subscription, churches built from private donations, and the like.

Famine relief works.—The public works department is responsible for the preparation and maintenance of the programme of famine relief projects, and is also liable, in times of famine, to be required to undertake famine relief works. This expenditure is occasionally of considerable magnitude; for example, in the year 1900-01, of a total expenditure on works of Rs. 2,10,91,573 in Bombay no less than Rs. 1,79,28,857 was incurred on works in connection with famine relief.

Present organization of the department.

7. Under the present organization each province is divided into a number of public works divisions in charge of executive engineers of (usually) between 10 and 20 years' service, the size of a division varying considerably according to territorial considerations and to the amount and extent of the work contained within it. Each division contains a number of sub-divisions, usually 3 or 4, in charge of assistant engineers, selected upper subordinates or (occasionally) selected lower subordinates. The divisions are grouped into circles in charge of superintending engineers, officers of (usually) 20 to 28 years' service, each circle consisting of from 3 to 6 or more divisions. The general control of all engineering operations in each province is vested in one or more chief engineers, who are also secretaries to the local Government. In some provinces where irrigation works are very extensive, *e.g.*, the Punjab and United Provinces, the public works department is divided into two separate branches, the buildings and roads branch dealing with all matters connected with communications, buildings of all kinds, sanitation, electricity, waterworks, etc., and the irrigation branch dealing with irrigation matters only. Elsewhere less distinction is made and the work is divided and officered as may be found most convenient. In all provinces (except Assam) there are two chief engineers, one for buildings and roads and one for irrigation, while in Bombay and the Punjab, on account of the magnitude of the operations, there are three. In addition to this staff there are in the major provinces a certain number of specialist officers, such as architects, sanitary and electrical engineers, who are attached to the buildings and roads branch of the department.

The Government of India exercises general supervision and control over the provincial public works expenditure, and maintains a detailed and direct check over the organization of the department and over matters connected with its personnel. The public works department of the Government of India is under the member of council in charge of the revenue and agriculture portfolio, who is assisted by a secretary, a deputy secretary and an under secretary, all of whom are drawn from the ranks of the department itself.

Duties of officers of the public works department.

8. The duties of the several classes of departmental officers may briefly be described as follows:—

(*a*). In the *executive engineer* is vested the executive charge of his division, and he is responsible for the management of all public works within his division. He arranges for all details of their construction, superintends the work of his assistants and maintains the accounts. He is responsible for the proper custody and efficient repair of all government works within his charge, and it is his duty to prepare designs and estimates for new works when called upon to do so. He is further required to exact a proper performance of their duties from the establishment subordinate to him, to pay particular attention to the economic application of labour and materials, and to prevent waste; for these purposes he is required to tour frequently over his charge. He is the professional adviser of all departments of the administration within the limits of his charge, and is required to keep himself in touch with the local officers of other departments in regard to their requirements. In some provinces he is also the technical adviser on public works to local bodies and may, at the discretion of the local Government, be called upon to execute works on their behalf. Within certain limits, the executive engineer may be empowered to accord technical sanction to estimates for works and repairs at the discretion of the local Government.

(*b*). The *superintending engineer* is the administrative head of his circle, and is responsible for the efficiency of the executive system throughout the several divisions therein, and for seeing that all orders in regard to the execution of works and maintenance of accounts are carried out. He may prepare the designs and estimates of the more important works himself, or entrust the same with general instructions to the executive engineer, as he may deem fit. It is his duty to examine and record his opinion upon all projects submitted through him to higher authority, particularly as to the suitability of the designs and the reasonableness of the rates. He is expected to make frequent tours of inspection, and may, within certain limits, accord final or technical sanction to estimates for works and repairs at the discretion of the local Government.

(*c*). The *chief engineer* is the administrative and professional head of the department, and as such exercises general control over all engineering operations and is professionally responsible for the character and suitability of all designs and estimates submitted through him to the local Government for sanction. He is required to give all legitimate support to the accounts officers in enforcing strict attention to the rules relating to disbursements of money and the custody of stores. He is responsible for the preparation of that portion of the budget estimates relating to his department, for the control of the annual grants, and for advising the local Government in regard to postings, transfers, etc., of superintending and executive engineers.

(*d*). The duties allotted to the *specialist officers* of the department vary in the different provinces. The consulting architect is, in general, responsible for the design of the more important buildings, and his advice on architectural matters is available for the officers of the depart-

ment whenever they desire to consult him. In Bombay 17(viii).
he is also responsible for the construction, in the presidency town, of all buildings designed by himself. The
sanitary engineer prepares all major sanitary projects,
and in some provinces he also maintains a staff of engineers 79(v).
and undertakes the execution of his schemes. The
sanitary engineer is subordinate to the chief engineer
in all provinces except Bengal and Bihar and Orissa, 79(vii).
where he works directly under the branch of the general secretariat which is responsible for local and municipal affairs. The electric inspector carries out statutory inspections under the Indian Electricity Act and in addition, in all provinces except Bombay, acts as adviser
to the local Government on electrical matters; in Bombay 36(i).
this latter function is performed by a separate electrical engineer.

Acknowledgment of the past work of the department.

9. Before proceeding to examine in detail the present administration and organization of the department, and to suggest such reforms as appear to us to be required, we desire to place on record our warm appreciation of the great work which has in the past been done by the public works department for the development of India, and to which so much of its material prosperity is due. The department was organized to suit the then existing conditions of India, and in making recommendations for changes in the present organization we in no way wish to imply that the policy adopted in the past was not suitable to those conditions. The changes we suggest are designed to meet the altered circumstances of the present day, which have resulted in great measure from the work of the department itself. We have therefore endeavoured to examine its working from a wider standpoint, and to determine whether it has advanced *pari passu* with the general development of the country. We wish also to make it clear that, in any criticism we may have to make as to its efficiency or organization, we are far from desiring to attribute any failure to the past or present members of the service, which includes a body of public servants who have done work of the greatest value for India, and whose devotion to the public interests is, we are convinced, second to that of no other Indian service.

CHAPTER III.

TRANSFER OF PUBLIC WORKS TO DISTRICT BOARDS.

Public works undertaken by government and by local bodies.

10. The main branches of the administration in charge of local bodies vary somewhat from province to province, but normally include roads and other communications, primary education, medical institutions, sanitation, vaccination, veterinary institutions, markets and rest houses, pounds and ferries, including the construction and maintenance of buildings relating thereto. There is, however, no clear distinction between the classes of public works undertaken by government and
by local bodies. In Madras, all roads in rural areas 77(i).
(with very few exceptions) are in charge of the district

boards; in Bengal and Bihar and Orissa, government maintains only the main trunk lines of road communication; whilst in most other provinces all the more important roads are in the direct charge of the public works department, the less important being left to the district boards. 31(i). There are no district boards in Burma, the road cess 7(ii). collections being administered by the deputy commissioner of each district through the agency of the public works department. The local bodies in all provinces except Burma are responsible for primary education, including the provision of buildings, but there is no clear dividing line in secondary education, such schools being maintained by both government and local bodies to a varying degree in the different provinces. Similar instances also occur in other branches of the administration.

There are also variations in the agency by which public works are constructed and maintained. As a general rule all government roads and buildings are in the direct charge of the public works department, although exceptions occur, some of which are noted below.

63(ii). A few municipal corporations of the presidency and other large cities employ their own engineering staff competent to meet all their requirements; municipal councils of important towns usually entertain an engineering establishment adequate to meet all ordinary requirements, but invoke the assistance of the public works department for the preparation, and sometimes the construction, of large projects such as water-works and drainage; small municipal towns as a rule engage only a subordinate establishment sufficient to carry out petty works and repairs, and rely on the public works department for larger projects.

31(ii). The district boards of Madras, Bengal and Bihar and Orissa entertain full engineering establishments with a fairly well qualified district engineer in charge, and carry out practically all their own works. In other provinces, district boards generally employ a less highly trained agency to deal with their minor works and repairs, other works being executed for them by the public works department, for whose assistance they ordinarily pay a percentage on the value of the work done. The system is least developed in Bombay and the United Provinces, where the district boards employ only a small subordinate agency to carry out original works costing less than Rs. 2,500 and Rs. 3,000 respectively and re- 28(ii). pairs. A trial has been made in the Central Provinces of a different arrangement, under which a local fund divisional engineer is appointed for each commissioner's division, at the expense of the district boards and smaller municipalities utilizing his services for their works, and in addition the construction and maintenance of certain government roads and buildings are entrusted to the local fund divisional engineer, grants to cover the expenditure being made to the district boards concerned. The district boards of Bengal and Bihar and Orissa also occasionally carry out small works for government.

Expenditure on public works by local bodies.

11. The average annual expenditure during the three years from 1911-12 to 1913-14 on works executed through the agency of district board establishment in the major provinces, and on the establishment employed thereon, is tabulated in the statement below. The details of this

expenditure are shown in Statement II attached to this report.

Province.	Works.	Establishment.
	Rs.	Rs.
Madras	78,76,436	9,43,972
Bombay	15,82,906	1,83,800
Bengal	36,24,590	4,81,290
United Provinces . . .	8,58,334	85,280
Punjab	22,16,328	2,36,230
Burma	1,63,371	59,810
Bihar and Orissa . . .	31,29,352	5,06,783
Central Provinces . . .	8,71,301	1,25,463
Assam	8,61,588	59,870
TOTAL .	2,11,84,206	26,82,498

The expenditure on works executed by municipal committees is not available for all provinces. The average for the triennium ending 1913-14, in so far as figures have been supplied, is tabulated below :—

Province.	Works.	Establishment.
	Rs.	Rs.
Madras	..	..
Bombay	30,41,485	6,66,804
Bengal	7,25,921	1,06,074
United Provinces . . .	18,50,448	1,29,438
Punjab	..	..
Burma	31,15,359	3,25,945
Bihar and Orissa . . .	8,58,552	36,415
Central Provinces . . .	8,56,919	36,226
Assam	67,851	10,857

Defects of existing arrangements.

12. The main defect of the present system is the duplication of engineering staff entailed thereby, one establishment being employed for roads and buildings directly managed by government, and another for public works in the charge of district boards, both working alongside each other in the same area. The evidence received by us shows the unsuitability and extravagance 34(i).
of this arrangement. The evil is intensified in Madras, where a third engineering establishment is employed 59(i).
by the collector for the maintenance of small government irrigation tanks, with the result that the district engineer travels along a road to supervise its maintenance, the public works officer to look after the buildings on it, and the collector's overseer to repair the small irrigation tanks near it. Economy is thus sacrificed by the employment of separate staffs to do similar classes of work in the same area, and we are not satisfied that such duplication of staff is necessary to the requirements of government or of district boards. As stated above, there is no clear distinction between the classes of work undertaken by government and by local bodies, or the agency by which they are constructed, and with the advance of local self-government the sphere of work undertaken by local bodies will increase and that of government will decline.

Another evil of the present system is that in many districts the public works expenditure of a district board alone is not large enough to justify the employment of 30(i).
a competent engineering staff. We are in full agree-

Decentralization Commission Report, para. 748.

ment with the principle of the recommendation of the
Royal Commission on Decentralization that a district
board should in any case maintain an adequate staff for
its own works, but this is not possible where the expend-
iture does not permit of the employment of a competent
district engineer. This difficulty was the main cause
28(iii). of the failure of a system in force in the United Pro-
vinces from 1882 to 1887, during which period district
boards employed an engineering staff to carry out their
own works and to make and maintain all roads other
than trunk roads. After four years of working, it was
abandoned because it was found that the dual establish-
ment for provincial and local works was costly and
involved a waste of power, that the district boards did
not secure a sufficiently good engineering staff and that
there was no control by a superior supervising staff.

32(i). The defect of absence of control by a superior
supervising staff over the public works of local bodies
is common to nearly all provinces. Whilst the designs
and estimates for all projects except petty works are
subject to the technical scrutiny and approval of superior
officers of the public works department, these officers
exercise little or no supervision over construction. The
ill-effects of the absence of this supervision are intensified
by the employment of a poor subordinate staff. Although
in some provinces (*e.g.*, Bengal and Bihar and Orissa)
the superintending engineer is *ex-officio* an inspector of
32(ii). works of local bodies, the evidence received by us shows
that in practice he exercises little supervision.

To remedy these defects, two alternatives are possible, the first that all public works should be undertaken by the public works department which is the system at present practically in force in Bombay and the United Provinces, the second that all ordinary public works should be transferred to local bodies, and for the reasons stated below we recommend the latter alternative.

Public Services Commission Report, Annexure XVIII, para. 4.

Transfer of public works to district boards recommended.

13. The Royal Commission on the Indian Public Services has recommended that the public works department should confine itself strictly to work which cannot be discharged either by private enterprise or through the agency of district boards and municipalities with the necessary financial support from government. In the next chapter we propose to make some suggestions for the encouragement of private enterprise, and we now deal with the second portion of this recommendation, regarding the transfer of public works to local bodies.

28(i). In 1892 a scheme was introduced in a substantial portion of Bengal, exceptions being made of districts with an irrigation staff and of certain backward tracts, for the transfer from the public works department to district boards of the maintenance of all public buildings and roads. The scheme also included the construction of original works for government by district engineers (*not* by district boards), who were given allowances for this additional work. The funds placed at the disposal of district boards for the maintenance of the works transferred to them were based on the average annual expenditure incurred on them during the previous four years, whilst for the construction of original government works the district engineer was provided with the necessary additional establishment. After four years of trial, the working of this scheme was examined by a committee, the majority of whose members condemned it, mainly on the ground of deterioration of the standard of work and unnecessary increase of rates, and recommended the abolition of district board engineering establishments, except a small staff for undertaking petty works only, and that all other public works, whether required by government or by district boards, should be undertaken by the public works department. This recommendation was not accepted by government because it involved a radical departure from the accepted principles of local self-government. Since then, however, government buildings and trunk roads have gradually been taken back by the public works department. We have carefully examined the report of the committee and the correspondence relating thereto, and are satisfied that the defects found in this Bengal scheme were not inherent in the main principle, and that failure was due to the unsuitability of the district board engineering establishment for the large additional work thrown upon it, the insufficient professional control provided by government and the lack of proper audit of expenditure. These defects are, however, easily surmountable. With all public works in the charge of one agency, we believe that there will be sufficient work, and there is certain to be a future increase, in all except small and backward districts to give full-time employment to a district board engineering staff of suitable qualifications. We are further of opinion that government grants to cover the cost and reasonable establishment charges will enable district boards to entertain such a staff. Adequate control by a government staff of inspectors of works with a small central agency of administrative and technical experts can be provided, whilst efficient audit can be secured by an expansion of the existing system of audit of local fund accounts. Another important objection urged against 43(iii). the proposal is that the government agency for dealing with famine relief will be weakened, of which the public works department is the backbone. We fully recognize the importance of this aspect of the proposal, but consider that the objection will be overcome by government taking the power to requisition the district board engineering staff both for relief works in time of famine and for the preparation of famine programmes. The establishment and maintenance of relief works in time of famine or scarcity are already included within the duties of district boards in the various local self-government Acts. 43(ii).

In paragraph 12 we have stated the objections to the present dual arrangement, and we are strongly opposed to the alternative proposal for the transfer of district 32(iii). board works to the public works department. The centralization of such work in a government department would result in a serious discouragement to local self-government, which it is the policy of government to advance. One of the important recommendations of Report of the Committee 1915, Chap. II, paras. 55 to 64. the committee appointed by the Government of Bombay to consider and report on the extension of the principles of local self-government is that district boards should employ their own engineering establishments for the execution of their works, but whilst this would be a considerable advance on the present backward state of affairs in that presidency, we do not consider that it goes far enough as a declaration of ultimate policy. The general trend in the advance of local self-government in all countries is for the transfer of public works from government to local bodies, and we recommend that it should be the declared policy in India to transfer public works (excluding irrigation which was outside the scope of our reference) from the public works department to local bodies. Important advantages of this change will be that it will give to local bodies a considerable share in settling the lines of development of the tracts for which they are appointed, and will bring public works into proper relation with the district and divisional 27(i). administrations. We believe that district boards will welcome such an extension of the sphere of local self-government, and that at least in advanced districts they can be entrusted with this duty under proper safeguards.

Decentralization Commission Report, para. 746.

Proposed arrangements for roads and buildings.

14. The Royal Commission on Decentralization has recommended that "routes of general trade or through traffic should be maintained by government, that the main local roads should be a charge of district boards, that sub-district boards should be responsible for minor roads, *i.e.*, those within the *tahsil* or sub-district area." Whilst this may be a suitable classification from the standpoint of financial responsibility, we are opposed to any arrangement involving the employment of three separate engineering establishments for the maintenance of different classes of roads in the same area. We recognize that government must secure the efficient maintenance of the main through routes of communication, important from military, trade or other considerations, but this does not necessarily involve the entertainment of a separate engineering staff for that purpose. In our opinion, the maintenance of all roads, under proper safeguards, should in principle be the function of local bodies, and the policy of government should be directed towards the eventual introduction of this system in its 77(iii). entirety. It has worked satisfactorily in the Madras presidency, where we have no reason to believe that the roads are less efficiently maintained than in other parts of India, and with the advance of local self-government we recommend that the same system should be gradually extended to other provinces. Similarly, we consider that the preparation of projects for new roads and their construction should not ordinarily be beyond the capacity of the district board engineering establishment, subject to the supervision of the inspecting staff recommended in our organization.

If this view is accepted, it follows that government buildings should ordinarily be entrusted to the same agency, in order to avoid unnecessary duplication of staff. We, therefore, also recommend that the construction of buildings required by government should generally be entrusted to local bodies. Exceptions would, of course, be made of large important building projects beyond the competence of the district board engineering staff, and similarly it will probably be convenient for local Governments to maintain under their own control government buildings situated at the headquarters of the province and any other important building centres sufficiently large to form a separate charge. Provision for such purposes is made in our scheme for the reorganization of the public works department.

As regards the maintenance of government buildings, we are strongly impressed with the desirability in any case of relieving the engineering staff of this mass of petty repairs work, which requires no engineering skill, absorbs an undesirable amount of the time and energy of the trained staff, and has a deadening effect on their technical skill. Much of the evidence received by us 2(ii). recommends that each department should be responsible for the ordinary annual repairs of the buildings occupied by it, an arrangement that is already in force in some 2(i). provinces in the police and jail departments. The main arguments urged against this proposal are that 2(iii). it would absorb too much of the time of officers to the detriment of their more important duties, and that the scarcity of reliable petty contractors necessitates some expert supervision even for simple repairs. We are not impressed by these arguments, and although some difficulty may be experienced at the start we recommend that the ordinary annual repairs of government buildings should generally be entrusted to the department occupying them, not as disbursing officers under the public P. W. D. Code, works department, but under a system of contract grants Vol. II, para. fixed with reference to the class of building and to the 1458. average cost of past maintenance at a percentage of the capital cost and placed at the disposal of the department like other contract contingent allotments. The buildings should be inspected at suitable intervals by an engineering officer in order to certify to their condition. Exceptions might, if considered desirable, be made of considerable groups of buildings at the headquarters of an engineering officer of the district board or government establishment, where supervision would not cause so much interference with other duties. It may also be desirable for special reasons to exclude officers' residential buildings from this arrangement. We are opposed to any arrangement under which a department would entertain any separate permanent technical building establishment, and therefore consider that special repairs, or additions requiring professional supervision, should be carried out in the same manner as original construction.

In tracts provided with government irrigation, an alternative arrangement would be for the officers of the 51(ii). irrigation branch of the public works department to take over government roads and buildings, which is already done in some provinces and which might be a suitable course provided that the works are conveniently situated within their charges and will not interfere with their own legitimate duties, but we recognize that difficulties may arise owing to irrigation charges not coinciding with district boundaries and from the multiplication of the duties of an irrigation specialist, and as we were precluded by our terms of reference from inquiry into the working of that branch, we make no recommendation on this point.

Financial arrangements for the transfer of works to local bodies.

15. When government works are thus made over to local bodies, it will be necessary for government also to transfer the requisite funds to the local body concerned. In our opinion the assignment should cover not only the cost of original works and the average cost of maintenance, but also the cost of the additional establishment that it will be necessary for the district board to employ on this account, calculated at a percentage of the expenditure on works. It will be desirable to revise the amount of the assignment for recurring charges at stated intervals of (say) five years, with reference to past actuals. We consider that the local body should be required to keep the financial accounts of public works in such form as

the local Government may direct, which should include a ledger account of assignments for particular works. 27(viii). Whilst we recognize the advantages of lump sum grants to local bodies for purposes within the sphere of their own functions, in order to allow freedom of decision as to the objects to which funds should be devoted, this does not apply to individual public works undertaken by them on behalf of government.

System of administration.

16. In provinces other than the Central Provinces, the district officer is ordinarily the chairman of the 27(vi). district board, and witnesses in favour of the transfer of government works to district boards generally consider that the interests of government in the administration of public works will be adequately safeguarded so long as this continues. But in some provinces an advance in local self-government is contemplated by the appointment of a non-official chairman elected by the board, and under such conditions it is generally recognized by those who gave evidence before us that for the present at all events some alternative method is desirable for the representation of government interests on the body 8(i). entrusted with government works. A proposal was made by the Chief Commissioner of the Central Provinces for the creation of a separate board of works for each district, composed of representatives of all the interests concerned, including government, the district board and municipalities, which should be entrusted with the management of public works. Although this proposal has several advantages we deprecate the creation of another public body in each district, which would interfere with the functions of existing bodies, and we prefer an arrangement under which the management of public works would be 27(vii). delegated by the district board to a committee of its members, on which the head of the district would also sit as chairman, even if not a member of the district board. Subject to its general control, the district board would be required to delegate to this committee the powers necessary for the management of all public works, including the power of appointment of the subordinate staff. We do not recommend that the inspector of works should be a member of this committee, but he should attend meetings when invited to do so or when his presence may be helpful and give his advice. All inspection reports and recommendations of the inspector of works should stand referred to the committee.

Organization of staff.

17. (*a*). *District engineers.*—An essential feature of our scheme is that each district board should employ a district engineer of sufficient qualifications, together with the necessary subordinate establishment, to carry out all ordinary public works required both by the district board and by government. Districts vary considerably in the importance of their public works, but in all except backward tracts the joint expenditure will usually be large enough to justify the employment of a competent trained engineer. We recognise that the salary must vary from province to province and from district to district in accordance with local conditions, but as a general guide we suggest the following scale as likely to meet requirements :—

	Rs.
1st class districts	800—40—1,000
2nd class districts	500—40—700
3rd class districts	300—20—400

We are opposed to any arrangement under which the district board engineer will receive separate allowances for government works, the system at present in force 29(vi). in Bengal and Bihar; he should be a whole-time officer of the board, paid as such and responsible for all public works entrusted to him.

Some witnesses have recommended that all district 29(v). board engineers of a province should be formed into a service, under which an officer would start in a less important and be promoted in due course to a more important district, on the grounds that such a provincial cadre would have the advantage of securing a regular flow of promotion and would obviate the evil of an engineer spending his whole service in one district with little or no promotion. But this arrangement would restrict the powers of district boards in the selection of their engineer, which would in our opinion be an undesirable interference with local self-government, and would weaken their responsibility for the efficiency of their staff. Difficulties would be likely to arise over transfers ordered by the local Government, for a district board might be unwilling to part with its engineer and accept the proposed transfer, and it would practically involve the creation of a new government service somewhat similar to the public works department. In our opinion the disadvantages outweigh the advantages, and we recommend that each district board should be free to recruit its engineer in the open market from the best candidates available in India. We believe that in practice this will secure one of the advantages claimed for a provincial cadre, because engineers who have proved their worth in small districts will naturally be considered favourably as candidates for the posts in larger districts.

At the same time some government control over the appointment, dismissal and emoluments of district board engineers is necessary to secure the interests of government and the efficient working of the scheme, and we recommend that the professional qualifications and the scale of pay for the different classes of district engineers should be prescribed by the local Government, that each appointment should be subject to the approval of the commissioner, that the dismissal of a district board engineer should be subject to similar approval, and that the local Government should have the power to require a district board to dispense with the services of a district board engineer who, in their opinion, is unfit to hold the appointment. In most provinces these powers already 29(i). exist.

A pension scheme is unsuited to this class of appointment, but we recognize the importance of some provision for the future of district board engineers, and we recommend the establishment of a compulsory provident fund on the lines of that in force in state railways, to which both the district board and the individual would contribute. Our colleague, Rai Bahadur Lala Ganga Ram, dissents from the recommendations made in this paragraph, for the reasons recorded in his minute attached to this report.

(b). *Inspectors of works.*—For the proper control of public works under our scheme, we consider it necessary to provide a government service of inspectors of works 27(v).

who would be qualified engineers of experience competent to guide professionally the operations of district boards and to safeguard the interests of government. They should ordinarily be recruited from selected district board engineers, but we would not wholly restrict recruitment to that source if better candidates are available from outside. Such officers should be engineers of standing, whose status in their profession should carry due weight, and the scale of salary that we recommend is Rs. 1,250 rising by annual increments of Rs. 50 to Rs. 1,750, which should attract officers of the status of senior executive engineers and superintending engineers. Their appointments should be permanent but not pensionable, and they should be required to join the provident fund established for district board engineers. At the outset we recommend that there should be one inspector of works for each commissioner's division where the scheme is introduced, which will much facilitate its working, but when initial difficulties have been overcome and experience has been gained, it should be possible to reduce the number and increase their charges.

We do not consider it desirable to give to inspectors of works powers of direct control over district boards or their engineering staff; their functions should be advisory, control being exercised by the commissioner and local Government. Their position should be that of technical adviser to the district boards and to the commissioner. Their principal duties should be to give professional approval to the plans and estimates of public works both of government and of district boards, subject to the money limits fixed for each by the local Government; to inspect works and bring any defects to the notice of the district board, and generally to assist the district board in its conduct of public works; to attend important meetings of the public works committee and give professional advice; to inspect the offices of district board engineers; to submit to the commissioner confidential reports on the work of the district board engineer, and to bring to his notice any case of a district board engineer whom he considers unfit for his appointment; to report to the commissioner any cases in which the rules for the conduct of public works have not been observed; to inspect the condition of government buildings, the ordinary annual repairs of which have been made over to the department occupying them; to prepare the plans and estimates of any government work not entrusted to the district board, and to arrange for its execution, when so required. In this matter we attach great importance to the personal performance of his duties by the inspector. These duties should not be delegated to subordinates or be conducted by correspondence from a centre.

(c). *Chief engineer and specialist staff.*—We do not propose any material alteration of the central organization at the headquarters of the province. The chief engineer will remain the head of the department, on Rs. 2,500—50—2,750, with a personal assistant of the status of an inspector of works, and will control the inspectors of works, from which branch of the service he will ordinarily be selected. He will be assisted by three specialists for sanitary, architectural and electrical engineering, where the provincial conditions justify their employment. In a later chapter (paragraphs 53 and 54) we make recommendations as to the method of recruitment, conditions of service and salary of these specialist appointments.

For the construction of government works not entrusted to local bodies, we do not propose that any permanent staff should be maintained beyond that recommended later on for the specialist branches of the service; such works should be carried out under the direct control of the specialist concerned or the inspector of works as the case may be, the necessary temporary establishment being engaged for the purpose.

Estimate of cost.

18. In framing our proposed scales of pay for the government service of inspectors of works and of the central staff of chief engineer and specialists, we have provided prospects which will, we believe, compare favourably with those recommended by the Public Services Commission for officers of the public works department of over 15 years' service. Our suggested scale of pay for district board engineers is designed to provide prospects somewhat superior to those recommended by the Public Services Commission for officers of the public works department of under 15 years' service recruited in India. We are unable to make any accurate comparison between the total cost of our scheme and that of the existing establishments of the public works department and of district boards, because this involves the grading of districts into classes, which we are not in a position to do, and because in some provinces the public works department establishment is jointly employed on irrigation and buildings and roads. We have, however, endeavoured to apply our scheme to the United Provinces, where the buildings and roads branch is separate, but which gives the most unfavourable comparison possible, because there is no duplication of staff, district board works being executed almost wholly by the public works department, and we estimate that even there the cost will not exceed that of the existing arrangement. We attach a statement (Statement III) giving details of the comparative cost in that province, which shows that the cost of our proposed organization will be Rs. $5\frac{1}{2}$ lakhs, as against Rs. $5\frac{3}{4}$ lakhs under the proposals of the Public Services Commission and Rs. 6 lakhs at present. In provinces where the public works department and district board establishments are duplicated, we are convinced that there will be a considerable saving in engineering staff and also in office establishments and travelling allowances.

Public Services Commission Report, Annexure XVIII, para. 21.

Control by government.

19. With the transfer of government works and the corresponding funds, we recognize the necessity for control by government both over such government works and also in the interests of the public over the works of local bodies. In the preceding paragraphs we have already dealt with certain forms of such control—the representation of government on the public works committee, audit of expenditure of government grants, the appointment, dismissal and emoluments of district board engineers, and the functions of inspectors of works. It remains for us to deal with other aspects of this question. We attach (Appendix A) a note by our colleague, Sir Noel Kershaw, on the functions of the Local Government Board, England and Wales, in relation to public works. It will be seen that even under such an advanced system of local self-government, the Local Government Board

exercises very substantial powers of control. Public works of any importance are almost invariably financed by loans, to which the sanction of the Board must be obtained. The application of a local body for sanction to raise a loan is examined not only with reference to the financial arrangements of the loan ; the necessity for and suitability of the project is investigated by the technical specialist staff of engineers of the Board. In important cases a local inquiry is held into the object and nature of the proposal, at which any person interested can represent his views, associations of rate-payers, property-owners and the like being sometimes represented by counsel. This method of control is inapplicable to Indian conditions, where public works such as buildings and roads are generally constructed out of revenue and not out of loan funds. If a local authority neglects to keep a highway in repair, the remedy is by indictment of the local authority concerned. Again, if a local authority fails to provide necessary sanitary works, complaint may be made to the Local Government Board by any interested person, and if satisfied of the default, the Board may make an order for the completion of the necessary work, enforceable by writ of *Mandamus* from the High Court, or may employ some person to do the work and collect the cost as a receiver of rates. The powers of auditors, appointed by the Board, are also very considerable. Any rate-payer or property-owner may attend the local audit and object to any item in the accounts. The auditor is required to disallow any item of account contrary to law and surcharge the same on the person making or authorizing the making of the illegal payment, and to charge against any person accounting the amount of any deficiency or loss incurred by the negligence or misconduct of that person, or of any sum which ought to have been but is not brought into account by that person. We do not consider that local self-government in India has sufficiently advanced to admit
27(ix). of powers being taken to surcharge individual members of local bodies, but we consider that there should be
27(x). power to surcharge a local fund, if a government grant for a particular work has been improperly expended. The powers of the Local Government Board depend largely on the initiative of representatives of rate-payers, property-owners and other interested persons, but public opinion is not generally advanced enough in India to perform a similar function. We have examined the
27(xii). various local self-government Acts, and we recommend that for the present government should take the following powers of control over the proceedings of local bodies entrusted with government works :—

(*a*). The collector may suspend, and the commissioner may cancel, any resolution relating to public works.

(*b*). The commissioner may require a local body, which has neglected a particular service after being called upon to execute it within a reasonable period, to take such action as he may consider desirable, subject to an appeal to the local Government against such order. (Compare paragraphs 803 and 860 of the Report of the Decentralization Commission).

(*c*). The commissioner may require the execution of a public work at the cost of the local fund, if a government grant for that particular work has not been properly expended.

(*d*). A member shall be prohibited from having any pecuniary interest direct or indirect in any contract given by a local body.

(*e*). The local Government may dissolve any local body refusing to take over government works and require a fresh election.

(*f*). The local Government may supersede a local body for incompetency or wilful neglect of duty.

In Madras where there are no commissioners, the local Government should nominate an officer to discharge the functions allotted to the commissioner in the preceding paragraphs. Experience will probably show that some of these safe-guards may be dispensed with, either generally or in particular areas.

Municipal works. 20. In the above sketch of our proposals, we have generally recommended the transfer of government works to district boards, because we believe that local body ordinarily to be the best suited for the purpose, but we contemplate that in some cases a similar arrangement may be made by government with a municipal body for works situated in their town, if that is found to be more suitable. If a town is large enough to employ a competent engineering staff, it may also be desirable to transfer to it government works within its jurisdiction. In smaller towns the municipal committee will be able to arrange with the district board for the execution of its works on terms to be mutually agreed upon. Where small municipalities are situated within easy reach, *e.g.*, in the outskirts of the presidency towns, they may find it convenient to combine for the employment of a joint engineering staff. 63(i).

Military works. 21. The military requirements in regard to public works are generally provided by the military works services, but in most provinces a small amount of such work is undertaken by the public works department in places where it cannot be conveniently managed by the separate military organization, the average annual expenditure on such works being about Rs. 9 lakhs, inclusive of Burma, where all military requirements are met by the public works department. We consider that such works can with other government works be equally well undertaken by local bodies.

Under the present system of recruitment the public works department provides appointments for thirty Royal Engineer officers, being a portion of the war reserve, in the irrigation and buildings and roads branches, of which the latter usually absorbs about twenty-four. We recognize that our proposals for a smaller government service will make it more difficult to employ so many Royal Engineer officers, and will not provide such a good training ground, but with the development of irrigation and railway construction it should be possible to employ more Royal Engineer officers in those branches.

Recommendations for immediate progress. 22. Whilst recommending that the policy of government should be to transfer government works to local bodies, we recognize that this cannot be carried out on a large scale at once, and that progress towards this end must be gradual. It remains for us to state the provinces in which we consider that local conditions are sufficiently advanced to warrant an immediate commencement. In our opinion local self-government has already progressed sufficiently to justify its introduction in the more advanced districts of Madras, Bengal and Bihar and Orissa, where the district boards employ an engineering

staff for their own works, and are in charge of nearly all the roads. In Madras, government buildings should be made over to the same agency instead of remaining with a separated irrigation branch. We also recommend
60(i). that the petty irrigation works at present in charge of the collectors may be made over to the district boards, and in addition some of the scattered minor irrigation tanks managed by the irrigation branch. In our opinion the present arrangement is unsuitable, and in order to give the district boards a living interest in the maintenance and development of these small irrigation works, we recommend that the district board should be given a liberal percentage of the irrigation revenue derived therefrom. In other provinces such small irrigation tanks are generally not government property, and are managed by their owners or the village community. In the Central Provinces and Berar we consider that local conditions are also suitable for the introduction of the system in the more advanced districts, particularly of Berar, and that it will give better results than the present arrangement of divisional local fund engineers. A trial may also be made in a selected commissioner's division of the Punjab, and a start might possibly be made in some districts of Assam. In Bombay and the United Provinces the district boards have not hitherto even undertaken their own public works, and we recommend that a substantial advance on this backward condition of local self-government should be made by the introduction of our scheme in selected commissioners' divisions. No district boards exist at present in Burma, but if and when they are introduced our general policy will doubtless be considered.

Arrangements during the transition stage.

23. During the transition stage from the existing arrangement to the complete transfer of government works to local bodies, considerable difficulty will arise not only in the recruitment of the public works department but also in the employment of the present staff. The curtailment of future recruitment to the department will depend upon the extent to which our recommendations are accepted, and an estimate of the time within which it will be possible to give effect to them. As regards the future of the staff at present employed in tracts where it is decided to introduce the change, we anticipate that the district boards will be ready to employ some of the officers and subordinate establishments and that the staff will be willing to accept this service under the terms laid down in Article 803 of the Civil Service Regulations. Some other officers may be employed in vacancies in other provinces and also in the irrigation branch. Failing such alternatives, there remains the course of enforcing compulsory retirement on the abolition of the appointment under the terms of Article 426 of the Civil Service Regulations, but the transition stage will undoubtedly be a long one and we scarcely anticipate that it will be necessary, except perhaps in a few cases, to resort to this expedient. It would certainly be desirable to avoid it.

CHAPTER IV.

ENCOURAGEMENT OF PRIVATE ENTERPRISE.

Description of the methods at present adopted for the execution of works.[1]

24. We now deal with the second important subject included in our terms of reference, which is whether under the existing system private enterprise is sufficiently encouraged.

All work carried out by the public works department is executed by one of three methods, either by piecework, or by contract, or by the employment of departmental labour. Piecework is the system chiefly employed. A piecework agreement is essentially a continuous tender by the contractor to execute specified work at specified rates without reference to quantity or time; if the contractor proves unsatisfactory, the engineer in charge can dispense with his services at any time by paying for the amount of work executed up to date, and similarly the contractor is at liberty to cease work whenever he desires to do so. Piecework contractors have usually little or no professional knowledge and employ no supervising staff, all supervision being carried out by government agency; they provide the labour and in most cases the ordinary building materials. Contract entails a regular legal agreement for the construction of a complete work either at a lump sum or more usually in accordance with a schedule of rates, and is seldom adopted except in large centres where firms of standing and repute are available. The up-country contractor employs for the most part no professionally skilled supervising agency, and the government staff usually sets out, supervises and measures the work, and supplies most of the tools and plant required and the stores imported from England. The execution of works by the direct agency of the department employing daily labour is ordinarily practised only in the case of petty repairs or in places where circumstances are exceptional and not even piecework contractors are available. When carrying out work departmentally the engineer in charge takes the place of the contractor, employing his own labour and either manufacturing his own materials or purchasing them at market rates; this method therefore entails constant supervision and complicated accounting. As already stated piecework is the method mainly employed, in some cases tenders being accepted for completed work, in others for labour only. We were informed that in Madras, during the past five years, no less than 42,467 piecework agreements have been entered into as compared with 625 regular contracts. Departmental execution of works is more common in 23(i). Madras than in other provinces, and is being followed even for the construction of important buildings in Madras town, such as the engineering college costing about Rs. 12 lakhs of rupees for works only, as an experimental measure in order to test the real cost of construction; we do not consider that this system should be followed for such large projects.

Discussion of arguments in favour of the piecework system.

25. The majority of the officers of the public works 67(i)-(ii). department who have given evidence before us have declared themselves in favour of the piecework as opposed to the regular contract system. Their main contentions are that the large contractor, as the term is understood in more advanced countries, is practically non-existent in India, that the contractors available are nearly always middlemen and not professional builders, employing pieceworkers for the execution of their works, and that hence they demand higher rates than the piece-workers would be content with if employed directly while requiring the same amount of supervision on the part of the depart- 21(iii). mental staff. Our inquiry shows that the number of reli- 67(i). able firms of contractors employing skilled staff is extremely small outside Calcutta, but it appears to us

that the main reason for the absence of the master contractor lies in the public works department itself. As now organized that department, with its detailed subordinate supervision, is working rather as a body of contractors than of engineers, and there is consequently no room for the introduction into the system of a further contracting agency, but we can find no reason why, if the organization of the department is suitably modified, contractors in the accepted sense of the term should not arise in India as in other countries. The "middleman" contractor appears to us to be a direct outcome of the present system, and we doubt whether under a different system he could survive in competition with a regular contractor who would, in his own interests, employ the most economical methods and act as middleman only when compelled to do so by circumstances. In the absence of such contractors, and, with the public works department organized as at present, it is doubtless cheaper for the latter to employ their piece-workers direct, but it must be remembered that government is in reality playing the part of the master contractor itself and incurring large expenditure on staff which should not rightly be charged to the establishment of the employer at all. Whilst we are wholly unable to accept the extreme recommendation made to us by some witnesses that reliable firms of 21(ix). contractors should be entrusted with works without any supervision beyond the inspection of the completed project, a system that is not followed even in England, we believe that the detailed supervision exercised by the public works department under the present system could be reduced by the employment of such firms. With the growth of the system it will be possible to secure the employment by contractors of qualified engineers, who will relieve the government staff of their present executive duties and render necessary the maintenance of only a small inspecting staff, with a permanent clerk of works on each large work or group of works. The existence of the present large subordinate supervising establishment deters reliable firms from tendering for government works, and even if its status is improved as recommended by us, it is in itself an effective bar to the employment of qualified engineers by contractors. Nor do we believe that the piecework system is conducive to economy in other directions. Not only must the present multiplicity of petty contracts increase the sum total of the contractors' incidental expenses to a figure considerably in excess of that which a single contractor would incur, but in addition government suffers from the inconvenience that the progress of the whole work may be delayed by any single piece-worker. The limit of time allowed for completion finds no place in a piecework agreement, and we consider that this is a serious defect in the system.

67(iii)-(iv). Several witnesses have urged that it is advantageous for government to have the power to terminate the agreement at any moment, and that it is much easier to make a piece-worker demolish bad work, or remove inferior material than a contractor. This contention appears to indicate an error in the departmental methods of dealing with contractors and to confirm certain evidence given before us to the effect that there is a tendency on the part 20(ii). of the engineers to condone breaches of contract rather than to suffer the inconvenience of a change of contractor.
21(v). We received evidence that small contractors actually rely

on such lenient treatment to tender at very low rates in the hope of getting the contract and later, during the execution of the works, of obtaining a rise in rates. If this is the case it indicates a serious flaw in procedure, since increases of rates during construction render competition nugatory and consequently prevent tendering by respectable contractors, who refuse to quote rates at which they know they will be unable to complete the work. One of the reasons given for the preference for piece-work agreements is that contracts are more likely to lead to litigation **67(v)** and not infrequently fail to stand the test of a civil court. The remedy for this defect is to revise the standard forms of contract in accordance with past experience. Contract documents should be properly drawn up in the first instance and thereafter be fully enforced ; and, except in very special circumstances such as war conditions, all rates, specifications and conditions should be strictly adhered to. Government will then be in a stronger position than it is at present in regard to the piece-worker, who can throw up the work at any time if his demands for increased rates are not met.

It has been suggested that the major portion of the **21(iv).** work of the department is scattered throughout the districts and is hence unattractive to large contractors. Whilst this is largely correct, we believe that in time contractors will extend the sphere of their operations from the larger centres into the districts, and we consider that they should at least be given every opportunity of doing so before other methods are adopted.

As will be seen from the arguments enumerated above, there is a tendency on the part of the engineers to judge the question from a purely departmental standpoint. We consider, however, that it should be viewed in a wider aspect, and as a result of our inquiry we are impressed with the necessity of encouraging the growth of contractors, a measure which we believe will tend to general industrial development and will give to the building and allied trades a stimulus which they at present lack. The introduction of the contract system will afford new openings for indigenous firms employing indigenous trained staff. We consider that, in judging this question, a prominent place should be given to these aspects and that immediate economy should be regarded as only one consideration among many.

Recommendations for the encouragement of private enterprise in the execution of public works.

26. At present the number of regular contractors and contracting firms available in India for the execution of public works is very limited, but we recommend that the policy of government should be directed to the encouragement of the growth of such a class. We are of opinion that this can most suitably be done by inviting tenders for complete works and by the introduction of the system of lump sum contracts, and our recommendations are therefore framed on these lines. We realize that advance must be gradual, but we believe that, if our proposals are accepted, a class of contractors will grow up to whom it will be possible to entrust work without the necessity for the present detailed subordinate supervision.

(*a*). *Original works.*—We recommend that tenders should invariably be invited in the first instance for the complete work in the case of a building, or for a substantial contract in the case of a road, and that, if such tenders are received, the whole work should be given to a single contractor, even if the resulting cost is likely to prove somewhat greater than that at which it would be possible to execute the work by piecework. We further consider that it should be incumbent on the officer empowered to accept the tender to record for the information of his superior officer his reason for refusing any tender for a complete work and accepting a tender for a part only of the work.

54(i). We also recommend a more extensive use of the lump sum contract, and consider that the introduction of this system in its entirety is the ultimate policy to be aimed at, by lump sum contract being understood a contract for the complete execution of a work at a fixed sum, accompanied by a supplementary schedule of rates upon which additions or deductions can be calculated. The form of contract should lay down that the contractor must set out the work himself and maintain a whole-time competent foreman on it, and should also specify a time limit. The terms of the contract should be rigidly adhered to, and no revision of the fixed sum permitted on the grounds of omission or mistake. We believe that this system will lead contractors to employ qualified staff, since under it the contractor will be responsible that the classes of workmanship and materials are in accordance with specification (a responsibility which at present rests mainly with the officers of the department) and thus lead eventually to the reduction of the government supervising establishment. In view of past practice, we consider that due warning should be given to all contractors, if necessary by public notice, that no revision of the terms of the contract will be permitted after once the tender has been accepted. There will probably be little or no saving in supervision at the outset but this will come in time, and we recommend on this ground that preference should be given to lump sum contracts, provided the contractor is reliable, even if the cost of the work is thereby somewhat enhanced. Two arguments have been raised against this system, firstly, the increased risk of litigation inherent in a lump sum contract, and secondly, the fact that contractors may send incompetent supervisors to take charge of works at a distance from their principal place of business. In regard to the first there is a possibility of litigation at the outset, but litigious contractors will cease to be employed and the evil will hence cure itself. As to the second, if contractors are so blind to their own interests, they will be responsible for the failure of private enterprise generally and their own in particular.

(*b*). *Repairs.*—In regard to repairs we consider that the present piecework and departmental systems are, on the whole, suitable. Various suggestions have been made to us for the encouragement of private enterprise in this respect also, that most frequently advocated being
21(vi). that all the repairs to buildings or roads within a certain area should be made over to a contractor for execution for a term of years. We do not recommend this system, which would inevitably lead to monopoly, but we see no objection, if it is considered desirable, to an exception being made in the case of the collection of road metal, in order to allow of the employment of machinery for the purpose and of the grant by the contractor of adequate advances to his labour. If, as proposed by us, the repairs of most government buildings are made

over to the administrative departments concerned, the importance of this branch of the present activities of the public works department will be very considerably reduced.

(c). *Electrical and sanitary work.*—In the case of electrical and sanitary work we deprecate departmental construction wherever, as in some of the presidency towns and larger centres, private agency is available. We recommend also that wherever such private agency is available and is willing to undertake maintenance work at reasonable rates, it should be employed for the purpose, departmental maintenance being resorted to only where no reliable firms exist, or where their tenders are excessive. Where private firms are available for construction only, departmental work should be strictly confined to *bonâ fide* maintenance, and any tendency towards the departmental execution of original works checked, as the latter leads inevitably to the accumulation of stores and the employment of special establishment, both of which we consider undesirable. 37(iii). 80(iii).

System recommended for calling for and accepting tenders.

27. From the evidence it appears that, under the present system, calls for tenders for public works are not in all cases sufficiently widely advertised, and we recommend that, in the case of large contracts, the local press and the trades journals should be more freely utilized for the purpose. For smaller works, notices should be posted at the office of the executive engineer and at other important public offices. It has been suggested that a list of contractors, classified according to their professional qualifications, financial status, etc., should be maintained in each division, and tenders invited only from those who, from the information contained in the list, appear capable of undertaking the work. This may lead to difficulties in practice, but we see no objection to the maintenance by the executive engineer of a list of approved contractors in his division and to the issue by him to such of them as he considers desirable of individual notices of contracts to be allotted, in addition to the public notification referred to above. Officers inviting tenders should reserve to themselves the right to refuse to accept the lowest or any tender, but we consider that when a tender other than the lowest is accepted, the officer doing so should record his reasons for the private information of the higher authorities. We are unwilling to accept in full the suggestion made by certain witnesses that contractors should be classified according to the staff maintained by them, and a specified percentage added to their rates to cover the cost of such establishment, but the saving which will accrue to government owing to the employment of contractors maintaining a skilled staff should invariably be taken into consideration and due allowance made by the officer empowered to accept the tender. 95(i). 21(i). 21(ii).

Supply of materials by government.

28. In many cases piecework agreements are given for labour only, the materials being supplied to the contractor by government and the cost deducted from his bill. In favour of this system under which government undertakes the manufacture of the materials required for its works, either departmentally or through the agency of petty contractors, it has been urged that it ensures that the quality is up to the specified standard, that the 55 (iii)-(vi).

rates at which government can procure materials in this manner are lower than those at which they can be purchased in the open market, and that the presence of a large government stock prevents fluctuations in price and ensures the maintenance of a reserve available to meet sudden demands. We see no reason to believe that government-manufactured materials are superior to those produced by private enterprise, or that the latter is incapable of supplying to government specifications.
72(i). As to economy, we find that no profit and loss accounts are kept of these operations and consequently the prices at which government materials are issued are frequently fictitious, excluding charges for superior direction, interest or depreciation, factors which both private firms and government should take into account in fixing
9(i). their prices. At Akra near Calcutta and at Madras large permanent brickfields are maintained by government. We found that these brickfields are not worked to their full capacity and sometimes, when the demand is slack, lie idle for considerable periods with the consequent dead charges accumulating but finding no place in the departmental accounts or in the cost of outturn. We do not believe that the cost of this occasional production of material to meet a fluctuating demand can be anything but extravagant in comparison with that of the regular outturn of private firms supplying the more or less steady demand of the open market. Nor do we consider that the suggested advantage of maintaining a reserve is, in most cases and especially in the larger centres, a suffi-
46(i). cient justification of the system. Government work does not usually form so large a percentage of the total works under construction that the sudden demands of the former are likely to exhaust the open market, and such demands are, in any case, infrequent. It may be true that the present system insures government against sudden rises of market rates, but it also prevents it from taking advantage of similar falls. We consider that this system is
55(ii). disadvantageous to private enterprise, especially when materials are issued to contractors at low but actually fictitious rates, not indeed deliberately but owing to want of knowledge of the actual cost. We recommend that when materials are available in the open market the
55(i). contractor tendering for the work should be encouraged to undertake the supply of all materials required for it, and that government manufacture should cease except possibly in outlying places where such materials cannot otherwise be economically obtained. We consider that there is no justification for the maintenance by government of brickfields in large centres, such as Akra near Calcutta and at Madras, and we recommend that the government connection with such operations should cease, except in so far as government may wish to continue freeholders of the land.

Maintenance of workshops by government.

29. The same remarks apply, to a large extent, to the maintenance of workshops. We consider that there is no justification for the maintenance of workshops by government except in the cases of temporary shops on large outlying works, where private enterprise is not available, and of small shops utilized solely for the execution of petty repairs. A workshop on any large scale can hardly run economically unless the fluctuating demand for special work is supplemented by the more or less constant demand for standard articles, and it is particularly

in regard to the latter that we consider government competition with private enterprise to be undesirable. The evidence that work executed in government shops is cheap is inconclusive in the absence of profit and loss accounts of these undertakings, and in the larger centres competition will prevent abnormal inflation of prices. An inquiry into the workshop maintained by the public works department 102(ii). at Roorkee in the United Provinces led to its abolition, and there is less justification for the maintenance of such workshops in more advanced provinces like 102(i). Madras. We therefore recommend that government workshops should be abolished, with the exception of those specified above, and private enterprise aided by the limitation of government competition and the addition of government trade to private trade. We realize that the abolition of the existing shops must be gradual, but we consider that the manufacture of articles of stock pattern therein should cease immediately, and that the use of such stock patterns should be insisted upon wherever possible.

Local purchase of European stores.

30. Much importance was attached by several witnesses, 88(iv). particularly those representing the various chambers of commerce, to the discouragement of private enterprise resulting from the rules relating to the purchase of European stores. Under the rules at present in force articles required for the public service and not manufactured in India must be obtained by indent on the India Office. Local governments, superintending engineers and P. W. D. Code, executive engineers are empowered to sanction departures Vol. III, from this rule up to limits of Rs. 3,000, Rs. 1,000 App. 30, and Rs. 200, respectively, provided the articles are already rule 13. in India at the time of order and that their price and quality are not unfavourable as compared with those of similar articles obtained through the India Office; while local governments have full powers and superintending and executive engineers powers up to Rs. 2,500 and Rs. 500, respectively, to sanction departures from the rule, provided the articles are in India at the time of order, in cases where serious inconvenience to the public service would be caused by waiting to obtain them from England through the Director General of Stores.

In favour of the present system it is urged that the purchase of European stores through the India Office ensures economy, since tenders are called for in the large manufacturing market of England and the necessity for dealing through middlemen is obviated, and that quality is safeguarded by means of inspections during manufacture and before despatch, and by tests conducted by the stores department, and that the framing of contracts and specifications receives the expert supervision necessary in this connection. The advantages of centralized buying are also secured, the Secretary of State being able to place large contracts for a year or more at a time at favourable prices. The system has, however, been severely criticised not only by the representatives of the 88(viii). chambers of commerce and of private firms, but also by the great majority of witnesses from the public works department. It is stated that any economy obtained 88(ii). by indenting on England is often counterbalanced by the inconvenience due to the delay involved and occasionally by serious waste of public money owing to the progress of

88(v). work being retarded; cases arise where firms in India are actually holding stocks of materials at prices which compare favourably with India Office rates and yet unless "serious inconvenience to the public service" can be claimed, the department is prohibited from purchasing 88(i), (vi). them locally. It is also urged that, when articles are ordered through the Indian branch of a British manufacturing firm, the firm is responsible that the goods supplied are in accordance with specifications, intact, and work satisfactorily at site, which is not always the case when orders are placed through the stores department.

There are in general three classes of firms through whom stores are obtainable in India, *viz.*, Indian manufacturing firms, branches of British manufacturing firms and agents of British manufacturing firms. The declared policy of government is to encourage the purchase of articles locally manufactured and produced, and the rules already prescribe that preference shall be given to such articles; we shall later propose measures to ensure that practical effect is given to this policy. In regard to the branches of British manufacturing firms we do not consider that the rules are equally satisfactory. While it is not necessary specially to encourage the establishment in India of branches of British engineering firms manufacturing articles that could equally well be produced in the country, we consider that more encouragement should be given to firms doing work of a kind which cannot at present be performed in India, such as the manufacture of electrical appliances, motors, generators, large and complicated machinery, etc. The existing demand for such plant is too small to admit of the manufacture being undertaken locally, and hence we are of opinion that firms dealing in plant of this nature should be encouraged to 88(vii). open branches and maintain stocks in India, thus tending to make the country self-contained in this respect. It will be for the Government of India to lay down in the first instance what articles are to be included in this category, the list being subject to revision as indigenous manufacture develops. Several such branches have already been established, but the existing rules militate 88(iii). both against their success and against the establishment of further ventures and also, in our opinion, affect adversely the efficient working of the public works department. Under existing conditions there is no inducement for any manufacturing firm to maintain in India a staff of experts capable of erecting the machinery it produces and explaining its working to the person in charge, with the result that difficulty is often experienced in the erection and working of machinery of types not hitherto used. We consider that it is advisable both from the point of view of efficiency and also to obviate the necessity for the employment of further government specialists, a question which is dealt with in the next chapter, that the public works department engineer should be able to give a contract to a reliable firm for machinery to be supplied, erected and set to work on site. It would also be highly advantageous to introduce in this connection, wherever possible, a modified system of centralized buying, running contracts being entered into with the manufacturing firms for stated periods without any direct specification of quantity, an indication being given, however, of the probable extent of purchase. Officers might then be permitted to obtain their requirements direct from the contracting firms at the agreed-on prices. The introduction of such a system would also lead to firms in India maintaining a stock of spare parts for such installations, thus avoiding serious delays in cases of accidents or breakdowns, and it would be to the interest of such firms to see that the best results possible are obtained by their clients from the machinery or plant they purchase. Again, when a spare part is urgently required but is not obtainable in India, although the firm manufacturing it may have a branch which can obtain it immediately by means of a cable to its head office, such a procedure is prohibited and the formality of indenting through the India Office must be observed. We are informed that a proposal has lately been submitted to the Secretary of State with the object of permitting officers to purchase plant and machinery from Indian branches of British manufacturing firms which maintain a staff capable of erecting the articles which they supply, subject to certain restrictions as to cost and the purpose for which the plant is required, but we would go further and recommend that subject to the conditions that the article is of a standard pattern, is one which cannot in existing circumstances be produced in India, and that the firm is approved by the Director-General of Stores for the supply of the particular article required, officers of the buildings and roads branch of the public works department should be given the same powers to call for tenders and to purchase European stores and plant from branches of British firms as they possess in respect to similar articles manufactured in the country.

The question of agency firms stands in our opinion upon a different footing. An agent cannot be expected to have the same expert knowledge as a representative of the manufacturing firm, nor are they responsible to the same degree for the firms they represent. A manufacturing firm will not usually open a branch unless there is at least a reasonable prospect that the increase in production will cover the cost of its maintenance without necessitating enhancement in prices, whereas commission will be added by an agent to the manufacturers' prices, and the Secretary of State can certainly expect to buy more cheaply than such an agency can afford to sell. Consequently we recommend no alteration in the existing rules in so far as such agency firms are concerned, considering that purchases of European manufactured articles from them should be, as at present, permissible only in cases of urgency and when the articles are actually in the country at the time of order.

In regard to the testing of materials and plant, the Alipore test-house, an institution equipped with appliances of the latest type, will probably prove adequate to meet existing demands, in so far at least as tests of the strength of materials are concerned, though possibly further test-houses of the same nature may be required later at the principal centres. There is, however, a large variety of articles which could be bought in India for which far simpler tests would suffice, and such tests could be conducted at small expense under suitable arrangements in each province. The real test however takes place when the plant is erected and set to work, especially in the case of electrical and other machinery. No respectable firm, **96(i).**

which had itself supplied and erected an installation, would risk its reputation by refusing to replace portions found to be faulty owing to inferior workmanship, and in many cases such faults cannot be detected until the plant has been at work for a period. This test, which we consider the most important, can only be applied when a firm in India is responsible. In so far as expert supervision of specifications and contract documents is concerned, we see no reason why this cannot be obtained in India as well as in England.

P. W. D. Code, Vol. III, App. 30, rule 3 (*b*) and schedule B.

In paragraph 28 of this chapter we have proposed that contractors should be encouraged to supply all materials required for their works, contracts being given for complete works and where possible at lump sum rates. The present stores rule restricts this privilege to approved firms of standing and repute, who are important structural contractors, whose command of capital, plant and labour are a guarantee against any risk of abuse, and who are not likely to risk the removal of their names and the loss of reputation resulting from the supply of inferior materials and stores. At present the names of nine firms only, eight in Calcutta and one in Bombay, are included in the list of such approved contractors. We are not in favour of this arrangement and consider that contractors
21(viii). should be permitted to supply all materials required for the execution of their contracts, the engineer in charge specifying the required quality or brand, preference being given, where possible, to Indian manufactured articles.

To ensure due encouragement and support to the Indian manufacturer we recommend that the following procedure should be adopted. All indents to the Secretary of State should be submitted through a central authority whose duty it will be to eliminate anything which can be made in India, or which is obtainable from the surplus stores of other departments, or from a branch of an approved British manufacturing firm in India, any tests that are necessary being made in the country. If, as appears not improbable, the development of general industrial activity in India leads to the expansion of the functions of the central and provincial industrial departments, they could suitably undertake this scrutiny also, and thus safeguard the encouragement of Indian industries. We believe that the acceptance of this recommendation will give considerable stimulus to private enterprise and have an important bearing on the general industrial development of the country.

Employment of private experts as architects, electrical and sanitary engineers.

84(ii). 31. Certain witnesses have represented that there is no necessity for the employment by government of architectural, electrical and sanitary experts, and that the work at present performed by these officers should be
6(i). entrusted to private firms. Our inquiry shows that the amount of work available would not be sufficient materially to stimulate private enterprise. If, for example, the consulting architect to the Government of Bombay and his entire staff were abolished, it would not give scope for more than one more large architectural firm in Bombay. In such matters it is usual, in the case of any undertaking of the same scope as government work, to employ whole-time experts rather than to utilize
17(i). private firms, and the cost of a whole-time government

architect and his establishment is in general only about half the amount of the fees which would be payable to private firms for the same work. Further, no great reduction of departmental establishment would be possible, as experts would still be necessary to examine and advise government in regard to projects prepared by private firms, while the electric inspectors would still be required for statutory purposes. It has also been suggested that government architectural work should be thrown open to competition by private architects, but owing to the lack of interest in the development of architecture on its artistic side in India at present we cannot support this proposal, although we recognize the suitability of such a system for such important projects as the new capital at Delhi, the Victoria Memorial in Calcutta, and any special case where the local Government considers it desirable to invite outside assistance and where the field of competition will not be confined to India; but as a general rule we consider that, provided sufficient work exists for a whole-time officer, the system under which government maintains its own architects, sanitary and electrical engineers is, for the present, suitable. 6(ii).

CHAPTER V.

REORGANIZATION OF THE PUBLIC WORKS DEPARTMENT.

1. *General proposals for reorganization.*

Necessity for recommendations.

32. As has already been explained, the transition stage during which public works in India will be in course of transfer from the public works department to local bodies will, in some provinces, extend over a substantial period, during which some at least of the operations of the department will continue. In accordance with the terms of reference we have, therefore, examined the existing organization and procedure of the department, and after consideration of the evidence which has been given before us we consider that, in the interests of general efficiency, certain changes in organization are desirable, that the present procedure is capable of considerable simplification, and that further decentralization is also required. Our recommendations on these subjects are contained in the following paragraphs.

Reorganization of establishment.

33. The reorganization of the establishment of the department was considered by the Royal Commission on the Public Services in India, which has recommended the abolition of the provincial service, as at present constituted, and the amalgamation of its *personnel* with that of the imperial service. In addition the commissioners have suggested that the upper subordinate branch should be transformed into a service organized on the model of the existing provincial civil services, and that, as suitable members of such a service became available for appointment as sub-divisional officers, a corresponding reduction should be made in the cadre of assistant engineers, the process of reduction being allowed to continue until the number of assistant engineers becomes just sufficient to provide for their promotion, in an officiating capacity, to executive rank after eight years of service. With these recommendations we are in full agreement. We consider that the department should be reorganized

Public Services Commission Report, Annexure XVIII, para. 7.

Ditto, para. 5.

in three services : a superior engineering service consisting of officers to fill the higher executive and administrative appointments, a second service organized on the model of the existing provincial civil services which will provide the bulk of the sub-divisional officers, and a single subordinate service, each of the two last mentioned with the necessary leave and training reserve.

Scales of pay for the provincial and subordinate services.

P. W. D. Code, Vol. I, paras. 14 and 15.

P. W. D. Code, Vol. I, para. 36, C. S. R. Art. 124, Note 1.

34. At present the pay of an upper subordinate ranges, in the ordinary course, from Rs. 60 to Rs. 400 per mensem. In addition, officers holding the rank of sub-engineer, 1st grade, may be granted two periodical increments of Rs. 50 per mensem each on completion of five and ten years respectively in that grade, as a reward for long and meritorious service. Upper subordinates placed in charge of sub-divisions draw also a sub-divisional allowance of Rs. 30 per mensem, or Rs. 50 per mensem in the case of a certain proportion of the upper subordinates in the United Provinces and the Punjab. The Government of India has recognized that the pay of this service is inadequate, and has authorized local Governments to reorganize the scale of pay of their upper subordinate establishments according to provincial requirements, subject to certain general principles and to a maximum and mean salary not exceeding Rs. 550 and Rs. 195 respectively. A revised scale of pay has already been introduced in the United Provinces, while in certain other provinces the reorganization has been sanctioned but is awaiting the return of more settled financial conditions before being introduced. We consider, however, that such reorganization of the existing establishment will not meet the necessities of the case. As pointed out by the Public Services Commission, the supply of upper subordinates qualified for appointment to sub-divisional charges is inadequate and it is hence essential that, before the number of assistant engineers can be materially reduced, the qualifications of the lower service should be raised. Our inquiry has convinced us of the importance of the duties of sub-divisional officers and of the necessity for filling sub-divisional charges not only with officers of good professional qualifications but also of a high moral standard, and we recommend a scale of salary starting at Rs. 250 and rising by annual increments of Rs. 15 to Rs. 550 per mensem, with a selection grade on Rs. 600—20—700 per mensem for ten per cent. of the members of the service.

Public Services Commission Report, Annexure XVIII, para. 5.

The extra cost entailed by the formation of this service may, we consider, be met in part at least by an alteration of the principles upon which the cadre of the engineering establishment is at present calculated. Under the existing system the superior establishment of the department, *i.e*, the number of officers of over 10 years' service, is maintained at a strength sufficient not only to man all administrative and divisional posts but also to provide a reserve of officers of the same standing to fill leave vacancies in these appointments, the number of assistant engineers being fixed so as to provide a regular flow of officers to the superior ranks as senior men retire. We do not consider that this leave reserve in the superior posts of the executive and administrative grades is necessary, and recommend its abolition. The number of superior officers, who will, if the Public Services Commission's recommendations are accepted, be officers of

Ditto

over eight years' service, should be equal to the number of superior posts, and leave vacancies occurring among them should be filled in an officiating capacity by assistant engineers, the sub-divisions vacated by the latter being held by officers of the proposed second service, the cadre of which must be sufficient to fill all leave vacancies in the superior service, to man all sub-divisions not held by assistant engineers, and to provide a leave and training reserve in the service itself, the leave reserve being thus where it is normally to be found in other services, namely in the inferior ranks.

It also appears to us that, with the formation of this second service and the consequential improvement in the class of officer holding sub-divisional charge, a reduction in the number of both divisions and sub-divisions should be possible, and a further saving be thus effected, particularly if the bulk of the repair work which at present devolves upon the public works department is transferred to other agencies for execution.

We do not desire to suggest any regular scale for the pay of the subordinate service, which need not be uniform throughout India, but we recommend that, in view of the increased scale of wages in all employment and in the interests both of honesty and efficiency, the minimum
pay should be raised from the present rate of Rs. 30 to 53(ii).
Rs. 50 per mensem.

Admission of mistris into the subordinate service.

35. A matter upon which considerable stress has 62(iii).
been laid by some witnesses is the desirability of appointing to the permanent staff of the department a certain number of the more capable *mistris*. The *mistri* is a master craftsman, employed by government on the subordinate supervision of construction work, who discharges most of the functions which in Europe devolve upon the clerk of works. It is commonly agreed that there has, in the last thirty years, been a steady deterioration in the *mistri* class and that craftsmen of the old type are seldom available, and it is urged that everything possible should be done to attract the best craftsmen and thus re-establish the class which is being lost. In our opinion, the reason for this deterioration is to be sought in the ever-increasing demand for skilled labour; the young *mistri* no longer stays with his father until he has obtained a thorough knowledge of his craft, as was formerly the case, but attracted by the prospect of high wages, he seeks employment when only half trained. The offer of permanent appointment will, we consider, do little if anything to improve the general type, and there are obvious disadvantages in the formation of a permanent service of skilled craftsmen, or in the admission of such men to the general subordinate service. We agree, however, that there is room in the public works department for two distinct classes of subordinate, the first of the sub-overseer type, for the execution of surveys and the preparation of simple projects, and the second for the direct supervision of construction work. The latter class might suitably be recruited, in part at least, from among the more capable *mistris*, men so selected being appointed to the temporary, as distinct from the work-charged, establishment. At present the pay of such *mistris* is charged direct to the particular work on which they are engaged and according to the strict terms of their employment their services

should be dispensed with on its completion. In practice, however, the better men are retained practically indefinitely, some of them indeed having been employed continuously for long periods of years, and we see no reason why this fact should not be recognized. We have considered whether, prior to appointment to the temporary establishment, such *mistris* should be required to undergo 62(i). a course of instruction in elementary estimating, surveying and drawing, but are of opinion that, although an acquaintance with these subjects would enhance their utility, insistence on any educational qualification would debar a large proportion of the best type of craftsman. The younger *mistris* should be encouraged to attend classes at the technical schools, and there acquire sufficient knowledge to enable them to prepare a simple estimate or to set out a work, but we deprecate any idea of educating them up to the sub-overseer standard, or of opening special classes for them at the engineering colleges. The main value of the *mistri* lies in his practical experience, and we are opposed to any measures which may, even indirectly, tend to give undue prominence to the theoretical training of men of this class.

Division of the department into irrigation and roads and buildings branches.

51(i). 36. The extent to which the irrigation and the roads and buildings branches of the department are separated varies considerably throughout India. In Madras there is no separation at all, and each officer undertakes within the limits of his charge all kinds of engineering work required by government, whatsoever its nature, with the exception of certain small tanks maintained by the collector. In Bombay certain divisions contain both classes of work, and a superintending engineer may have, within his circle, some divisions engaged wholly on irrigation, some engaged wholly on roads and buildings, and some " mixed " divisions doing both, transfers of establishment being made indiscriminately between the branches as the exigencies of the service demand. In the United Provinces and the Punjab the two branches are entirely separate and form practically two departments, transfers of establishment from one to another being made only in very exceptional circumstances. We are not prepared to recommend the adoption of any uniform system. Before doing so it would have been necessary for us to investigate to what extent the maintenance of separate branches is desirable in the interests of irrigation, a question not covered by our terms of reference and which would have tended to enlarge undesirably the scope of our inquiry. The matter was considered by the Irrigation Commission of 1901-03 and, although uniformity of system throughout India was not recommended, the general tenor of their report was in favour of specialization in irrigation management by a separate staff. The importance of the question will be greatly lessened if effect be given to our recommendations in regard to the transfer of works to local bodies; with the passing of the buildings and roads branch in its present form and the substitution of an inspecting agency in its place, the irrigation branch will automatically be separated. In the circumstances we desire to make no recommendation; it appears to us that the various systems at present in force have grown up to suit the particular local conditions and requirements of each province.

Irrigation Commission Report, Part I, paras. 502-303.

Powers of promotion to the rank of chief and superintending engineer.

37. Prior to the year 1910 provincial Governments, with the exception of Madras and Bombay, had no power to appoint their own chief and superintending engineers, all promotions to and in those classes being made by the Government of India. The suitability of this system was questioned by the Decentralization Commission of 1907-08, which held that the provincial public works staffs were large enough to secure continuous promotion and to provide adequately for the filling of the higher posts, that frequent transfers were undesirable, that officers should be kept as far as possible within the same province, and that the local Governments themselves were the best judges of their own requirements; and it recommended that the Governments of all major provinces should be given the same powers in the matter as those enjoyed by Madras and Bombay. As a result of this recommendation the Government of India, in 1910, delegated to local Governments the power to appoint their own superintending engineers, but retained in their own hands the appointment of chief engineers, further reserving to themselves the right to make inter-provincial transfers in the event of a serious block in one province and very rapid promotion in another. It soon, however, became obvious that the Government of India's power of interprovincial transfer was nominal, since the local Governments concerned had usually made their own promotions before the Imperial Government was aware that the vacancies had occurred, and it was also found that difficulties arose in regard to the appointment of a chief engineer to a province of which he had no previous local knowledge or experience. In order to ensure against unduly rapid promotion in any one province, and to enable them to transfer an officer, selected for a chief engineership, to a superintending engineer's post in his new province for some period prior to his appointment as chief engineer, the Imperial Government in 1913 further qualified the delegation by prohibiting local Governments, without first reporting the matter for approval, from promoting any officer to the rank of superintending engineer 3rd grade with less than 21 years' service, or to that of superintending engineer 1st grade with less than 27 years' service. Thus a large number of such promotions are now reported for approval to the Government of India. The disadvantages of the system are evident. Local Governments are often unwilling to part with their best men, particularly if there is a probability that they will succeed to chief engineerships in their own provinces within a reasonable time, and it has been suggested that there is a tendency to recommend the transfer of an officer, not altogether in the first rank in regard to efficiency, and so clear the way for more competent juniors without the necessity for superseding the senior. It has also been urged with considerable force that even the best of officers, transferred in the last years of his service, may not prove a successful chief engineer in a locality with the particular problems and conditions of which he is unfamiliar. We consider that the balance of advantage is in favour of allowing the provincial Governments to make their own promotions, and that the interests of the individual, the safeguarding of which is the principal attraction of the present system, should not be allowed to interfere with the general efficiency of the department. The existing system causes a

Decentralization Commission Report, paras. 218-220.

large number of references to the imperial secretariat, who at best are working largely without personal knowledge of the men concerned, and is apt to lead to friction with local Governments. The statement below shows, for each province, the sanctioned cadre of engineers and the sanctioned number of administrative posts, and in the present circumstances there appears to be no reason for denying the right to make its own promotions to any province except Assam, which maintains a small cadre of only 21 officers. Bengal already has this right, since its elevation to the rank of a presidency Government.

Province.	Sanctioned strength.	
	Total cadre.	Administrative posts.
Punjab	165	17
United Provinces	127	12
*Bombay	101†	10†
*Madras	99†	11†
Burma	92	9
Central Provinces	62‡	8†
Bihar and Orissa	49†	7†
*Bengal	49†	7†
Assam	21	2

Our recommendations in regard to the increased employment of district board staff will, if accepted, result in a decrease of cadre strength, but this must of necessity be gradual. In the Punjab and the United Provinces, moreover, of the total cadre strengths 122 and 70 respectively are in the irrigation branch, which will be unaffected, and in both provinces large canal projects are in course of preparation which are likely to absorb a portion at least of any decrease in establishment which may be possible in the buildings and roads branch. Burma is not likely to be materially affected by our recommendations for a long time to come, owing to the backward state of local self-government in that province, while in the Central Provinces again the development of irrigation will probably compensate in part for the reduction of building and road work. It is possible that the spread of the district board system in Bihar and Orissa will result in a reduction of the public works department cadre to such an extent that in that province also it will be impossible to ensure regular promotion to administrative posts, but we foresee little or no difficulty in combining it with Assam and Bengal and constituting a joint cadre of the three provinces for this purpose only. For the present we recommend that the power to appoint their own superintending and chief engineers should be delegated to all the local Governments and Administrations in the above list with the exception of Assam, which should be amalgamated with Bengal for this purpose. In order to guard against unduly rapid promotion to the senior post of the department we would, however, make the proviso that no officer of less than 25 years' service should

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* These provinces already make their own promotions.

† Includes one post sanctioned only temporarily.

‡ Includes two posts sanctioned only temporarily.

be promoted to the rank of chief engineer without the approval of the Government of India. Local Governments will, of course, be at liberty to ask the Imperial Government to transfer an officer to them from some other province, should they consider no suitable promotion can be made from their own establishments.

Tenure of the office of chief engineer.

38. A further point which has been put before us in regard to the terms of appointment of chief engineers is that the present rule, which requires that a chief engineer shall retire at the age of 55 years, causes administrative inconvenience. The objections to the existing system are three in number. Frequent changes in the administrative and professional head of a department are undoubtedly detrimental to efficient working and yet it is an undeniable hardship for a really capable officer to be prevented from rising to the highest post in the department because, for no fault of his own, he has only become eligible for promotion a short period before the date of his superannuation. Similarly it is unfair to a local Government that a capable chief engineer, having served for a comparatively short period in that position, should, although in full possession of his powers, be forced to retire and thereby subject it to the inconvenience of a change of incumbents. Finally it has been suggested that local Governments do not always exercise the same rigid selection in the case of an officer with a short period of service before retirement as they would if a specified tenure of office were prescribed, irrespective of the age of the holder. The Public Services Commission has recommended a modification of the rule regarding the compulsory retirement of officers on attaining the age of 55 years, and we consider that, in the interests both of the department and of the administration, a relaxation of the existing strict rule in the public works department is required in the case of chief engineers. We therefore recommend that any officer selected for the post of chief engineer should be granted a minimum tenure of three years of that office, irrespective of the fact that he may, during such tenure, exceed the age of 55 years. At the same time we think that where an officer has passed the age of 52 at the time when his promotion to the position of chief engineer comes up for consideration, this fact and the effect of his promotion on juniors eligible for the post should be fully weighed before his promotion is decided upon.

14(iv).

C. S. R. Art. 650.

Public Services Commission Report, para. 73.

C. S. R., Art. 650.

Promotions to and in the administrative and executive ranks.

39. The question of promotion in the public works department is one to which we have given careful consideration. Although it has always been laid down that seniority is not in itself a sufficient ground on which to base a claim for promotion, that no officer should be promoted who is not considered decidedly deserving of it on the ground of good service, that more importance should be attached to merit, and that the convenience of the public service should be paramount to all other considerations, yet there is abundant evidence that these rules have often, in the past, been very loosely interpreted, the main criterion for promotion having been that an officer should have nothing particular recorded against him rather than that he should have anything particular recorded in his favour. The result has been that some officers have been promoted both from the executive to the administrative and from the assistant to the

P. W. D. Code, Vol. I, para. 77, (before amendment).

73(ii).

Decentralization Commission Report, paras. 637-641 and 649.

P. W. D. Code, Vol. I, paras. 75 and 76 (revised).

executive grades who not only cannot be considered the best candidates available but who cannot even be considered fully qualified within the meaning of the regulations for the positions they occupy. The Decentralization Commission in their report laid great stress on the necessity for a more rigorous selection of officers for the higher posts, particularly with reference to the Indian civil service, and, in pursuance of the general principle involved in their recommendations, the Government of India issued in 1916 a revised code of rules for the regulation of promotion in the public works department. The essence of these rules is that promotion to the rank of chief and superintending engineer shall invariably be made by selection from the most competent and otherwise suitable superintending engineers and executive engineers respectively, and that seniority shall be regarded only where other qualifications are practically equal; while in regard to the promotion of assistant engineers to executive rank it is laid down that no assistant engineer shall be promoted to the rank of executive engineer unless he is considered to be fully qualified to hold charge of a division, and that, subject to this condition, an officer shall be promoted in his turn on completion of the prescribed period of service. In regard to the rules for promotion to the ranks of chief and superintending engineer, we fully endorse the Government of India's order that such promotion shall be made by pure selection, and we trust that local Governments will administer the rule with full rigour, all personal and other considerations being disregarded. We have also considered carefully the revised rule relating to promotion to executive rank, and we should have preferred a system of selection at this stage also, but we are convinced that there are grave difficulties in the way of giving effect to such a recommendation. In the first place it must often happen that, in the early years of his service, one young officer will have considerably greater opportunities of showing his worth than another. Thus, for example, one assistant engineer may be employed upon a large construction work, and so be kept constantly in the eyes of the authorities, while another may be doing unobtrusive but none the less meritorious work in backward districts, with not the same opportunity of coming to the front; any system of pure selection must inevitably favour the former at the expense of the latter.
49(i). In the second place it has been represented to us that, during the first years of his service, the Europe-recruited engineer has certain natural advantages, due largely to early environment and inclination, over his Indian colleague, and that selection at this stage would at times lead to the supersession of Indians who, though qualified for divisional charge, might not be so well equipped practically as their juniors recruited from Europe who had spent their youth in an environment where things mechanical play a much larger part than in India. The result would be either injustice to the Indian or the establishment of two separate standards of efficiency, a condition of affairs which we deprecate. The effect upon recruitment in England of such a change in the system of promotion to executive rank would also need careful consideration. Hence we do not propose that any change should be made in the existing rule, which has not yet been long enough in force to show how it will operate in practice, but we consider that a very strict

interpretation should be placed upon the words "fully qualified," and that no officer, either Indian or European, should be promoted to substantive executive rank until he has shown conclusively that he is capable of managing a divisional charge efficiently and economically, and is fit to be entrusted with the full powers which, in paragraph 68 below, we recommend should be delegated to executive engineers.

Compulsory retirement of inefficient officers.

40. The question of the compulsory retirement of inefficient officers was dealt with at some length, more especially in regard to the Indian civil service, by the Decentralization Commission, and the Secretary of State has since passed orders on the subject. These orders enunciated his power to order the retirement of any officer definitely proved unfit for further advancement. The same principle has since been made applicable to the public works department, and inefficient officers may now, with the approval of the Secretary of State, be removed from the department at any stage of their service, a pension being granted where the circumstances justify such a concession. The Public Services Commission laid stress on the importance to the services of a strict and regular application of these principles and with this conclusion we are in entire agreement.

Decentralization Commission Report, paras. 642-643 and 649.

Public Services Commission Report, para. 72.

Proposed promotion board.

41. As already stated, we are of opinion that, in the past, sufficient attention has not been paid to the principle of selection in making promotions to the administrative grades, and that assistant engineers have been promoted to executive rank before they were qualified to act as efficient divisional officers. We realize that the position of the head of the department is, in such cases, difficult, since to mar the career of any officer by superseding him is a step which would naturally only be adopted with reluctance, and a heavy responsibility rests on the chief engineer in recommending such supersession. It is probably due to this fact that excessive leniency has been shown in the past, and we fear lest, if the present system be allowed to continue, the same may be the case in future. For this reason we consider it advisable to remove the onus of recommending supersessions from the shoulders of an individual, and to entrust all substantive promotions to executive or administrative rank to a board, the recommendations of which would naturally be more impersonal than those of a single officer. Such a board might suitably consist of the chief engineer, a selected superintending engineer and an experienced administrative officer of another department. Promotions would be made after a consideration of the reports of all the eligible candidates, and the board would have power to call for explanations, should they so desire, from any of the superior officers whose remarks required further expansion or elucidation. They would also examine the reports of all officers whose names were likely to come before them during the following year or two and might even, in case of conflicting remarks by two or more of such an officer's superiors, recommend his transfer so as to obtain the benefit of a further opinion before his time for selection fell due. In this manner they would be enabled to collect reliable data before arriving at their final recommendations. We desire to make it clear that our proposal is not in any way to be regarded as an attempt to trench upon the legitimate

73(i).

authority of the chief engineer as head of the department, but is intended to relieve that officer of the very difficult position in which he must, under existing circumstances, often find himself, and to entrust the exercise of patronage, at all times one of the most anxious of duties, to a board rather than to an individual officer.

Position of the sub-divisional officer.

42. Although the division is usually considered as the executive unit of the department, and although the executive engineer is theoretically responsible to the higher authorities for the execution and management of all works within his division, in practice the sub-divisional officer actually arranges the details of the work and superintends its execution. It is also, in most cases, the sub-divisional officer who disburses payments, and who is responsible both for the measurements of the work done and for the primary accounts. The sub-divisional officer thus plays a most important part in the operations of the department; it would indeed hardly be an exaggeration to say that it is upon the integrity and capability of its sub-divisional officers that the efficiency of the service mainly depends. As we have already indicated, the supply of upper subordinates qualified for appointment to sub-divisional charges is inadequate, and it is mainly with the object of attracting a superior class of men for these posts that we have recommended the formation
53(iii). of a provincial service. Under the present system it not infrequently happens that a sub-division, containing work entailing an expenditure of from one to two lakhs of rupees per annum, is placed in charge of a lower subordinate on a total salary of perhaps eighty to one hundred rupees a month. That it should be necessary to draw at all on the lower subordinate class in order to fill posts of this importance argues defects in the cadre strength of the superior establishments which require early attention, but until these defects can be remedied subordinates placed in sub-divisional charge should, in the interests both of honesty and of efficiency, be given at least a reasonable remuneration for the duties they are required to perform. We therefore recommend that the sub-divisional allowance admissible to subordinates should, in every case, be raised to Rs. 50, and that the minimum salary (including sub-divisional allowance) payable to a subordinate placed in sub-divisional charge should be fixed, irrespective of what his substantive pay may be, at Rs. 150 per mensem.

Rules relating to the taking of private practice by engineers of the public works department.

43. The engineers of the public works department are, in regard to the undertaking of private practice,
C. S. R., Art. 74. subject to the ordinary rules of the Civil Service Regulations, which lay down that, before any work entailing the payment of a fee can be undertaken by an officer in government employ, the previous sanction of the head of his department must be obtained. It has been urged that this rule, in effect, debars engineers from taking up private work of any kind, since such work, particularly if it is of the nature of advice or criticism, if required at all is usually required immediately, and there is no time to refer the matter to the higher authori-
71(i). ties. Some witnesses have suggested that officers of the department should, without the necessity for superior sanction, be permitted to take private consulting practice, and in support of the proposal it has been urged that a general raising of the level of engineering throughout

India would result, that persons who now embark on constructional projects without professional assistance because as a rule none is available would invoke the advice of the nearest public works department engineer and that, as the private practice of medicine by officers of the Indian medical service has proved of advantage to India as a whole and popularized sound systems of treatment, so the private practice of engineering by the officers of the public works department would lead to the extended application of sound principles of engineering practice which, under existing circumstances, are often sadly lacking. While admitting that these arguments are not without force, we see grave difficulties in the way of a relaxation of the present rule. An engineer is a whole-time servant of the government, paid as such, and there would be a very real danger that private practice, even if only consulting practice, to an unlimited extent, might interfere seriously with the officer's legitimate duties. The case of the medical service is not an exact parallel apart from the question of salary, for if civil surgeons were debarred from giving their services, unnecessary danger to human life would be caused. Any such permission would also, we consider, be opposed to the spirit of our general recommendations regarding the encouragement of private enterprise, as it would hardly be possible to permit private practice to government engineers in localities where other practitioners do not exist, and to deny it elsewhere, whereas to grant it in the latter case would entail the institution of competition between a salaried whole-time servant of government, who utilized his practice merely as a means of adding to a guaranteed income, and a private engineer whose fees were his only source of livelihood. Taking all these factors into consideration, we are unable to recommend any change in the existing rule.

Proposed institution of central designing offices.

44. The suggestion has been made that it would be 12(i).
an improvement in procedure to create a central designing office in each province, which would be responsible for the designs of all works to be undertaken by the department. It is urged, in favour of the suggestion, that the employment of a skilled specialist staff would lead to greater efficiency and economy than can be obtained under the present system where the project is prepared by an executive engineer who may or may not have previous experience of the class of building he is called upon to design. We are, however, opposed to this proposal. The difficulties of preparing designs without full knowledge of the local conditions would be great in many cases. The advantages claimed for it are already largely met by the adoption of standard plans, and, in our opinion, to divorce design altogether from construction and to degrade the executive engineer to the position of a builder, pure and simple, would result in serious detriment to the efficiency of the most important section of the departmental establishment.

Cost of establishment in the various provinces.

45. We have collected statistics showing the extent of the charges of the different classes of officers, the relative cost of establishment, both for direction and construction, to work executed and the staffs employed. The figures in the table on the next page relate to the triennium 1911-12 to 1913-14.

PROVINCE	EXTENT OF CHARGES. (IRRIGATION AND BUILDINGS AND ROADS BRANCHES).						COST OF ESTABLISHMENT (BUILDINGS AND ROADS ONLY).					UPPER SUBORDINATE ESTABLISHMENT (BOTH BRANCHES).	
	SUPERINTENDING ENGINEERS.		EXECUTIVE ENGINEERS.		SUB-DIVISIONAL OFFICERS.								
	Average area per circle.	Average expenditure per circle.	Average area per division.	Average expenditure per division.	Average area per sub-division.	Average expenditure per sub-division.	Average annual cost of works.	Average annual cost of establishment.	Percentage of establishment to works.	Average annual cost of direction.	Percentage of direction to works.	Sanctioned permanent strength.	Temporary upper subordinates.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Square miles.	Lakhs of rupees.	Square miles.	Lakhs of rupees.	Square miles.	Lakhs of rupees.	Lakhs of rupees.	Lakhs of rupees.	Per cent.	Lakhs of rupees.	Per cent.	No.	No.
Madras	20,538	14·87	4,639	3·35	1,123	·81	64·14	13·51	21·0	2·20	3·4	318	190
Bombay	26,556	34·70	4,275	5·11	686	.82	110·44	16·50	14·9	3·48	3·1	249	93
Bengal	22,747	17·76	7,240	5·85	1,574	1·27	68·73	11·45	16·6	3·20	4·7	71	11
United Provinces	18,777	16·04	3,852	3·26	1,252	1·06	..	..	..	..	..	109	27
United Provinces (buildings and roads only)	26,817	23·27	7,151	6·14	2,024	1·74	93·05	14·65	15·7	3·52	3·8	64	25
Punjab	10,526	19·29	2,138	3·95	912	1·68	..	..	..	..	..	181	65
Punjab (buildings and roads only)	32,208	19·84	7,433	4·72	2,684	1·70	63·13	9·54	15·1	3·00	4·7	41	7
Burma	36,548	17·23	7,462	3·92	2,950	1·55	95·91	22·74	23·7	5·68	5·9	125	28
Bihar and Orissa	16,628	12·53	5,543	4·18	1,363	1·03	47·09	7·49	15·9	2·38	5·0	60	23
Central Provinces	41,947	24·80	9,322	5·51	2,099	1·24	58·79	10·06	17·1	2·65	4·5	55	48
Assam	42,829	33·24	8,781	6·03	2,364	1·62	38·68	6·81	17·6	1·90	4·9	34	5
Average	22,308	19·29	4,866	4·19	1,349	1·16	..	..	..	..	..	..	..
Average (excluding United Provinces and Punjab irrigation branches)	27,897	20·36	6,421	4·70	1,567	1·15	..	..	17·6	..	4·4	..	..

NOTE.—The figures in columns 2 to 7 are based on the number of permanent circles and divisions (exclusive of special and extra divisions) included in the cadre in 1913-14. The figure in column 5 includes the expenditure in temporary divisions but in working out the average the aggregate expenditure has been divided by the number of permanent divisions only.

The figures in columns 8 to 12 are taken from Statement I appended to the report.

The figures in columns 13 and 14 are extracted from the classified list of establishment for June 1914.

These figures show considerable variations in the different provinces, and we have failed in several cases to obtain explanations of such variations. Owing to the different systems in force and to the varying conditions under which public works are executed throughout India, we realize that the figures are not in every case directly comparable and hence we refrain from making specific recommendations on the subject, and we content ourselves with pointing out the principal variations and with suggesting that the reasons for them might advantageously be investigated by the Government of India and the local Governments concerned. In this respect increased intercommunication between provinces as to the relative economy of the systems in force appears to us to be desirable.

The average percentage borne by the cost of establishment to that of works throughout India is 17·6, and varies from 14·9 in Bombay to 23·7 in Burma. The circles, divisions and sub-divisions in the latter province are, however, well above the average in area, and the high percentage is probably in part attributable to the scattered nature of the work. The figure of 21 per cent. in Madras is also high. This latter percentage is an approximate estimate only, for the irrigation and buildings and roads works are jointly carried out by a single staff, and the maintenance of a large number of small scattered irrigation works doubtless necessitates the employment of a large establishment, but we desire to draw attention to two facts—the small expenditure per circle, division and sub-division compared to that in most other provinces and also the very large number of upper subordinates entertained. 101(ii). There appears to be no *primâ facie* reason why Madras alone should require 30 per cent. of the whole upper subordinate establishment employed in India. As will be seen from Statement II attached to the report, the district boards in Madras carry out annually work costing Rs. 78·76 lakhs with an expenditure on establishment of Rs. 9·44 lakhs, whereas the establishment charges of the public works department, excluding direction, amount to Rs. 11·31 lakhs on a works expenditure of Rs. 64·14 lakhs only. Excluding Madras and Burma the average for the remaining seven provinces is 15·9 per cent.

The average percentage borne by the cost of direction, *i.e.*, chief and superintending engineers and their offices, throughout India is 4·4, which accounts for almost exactly 25 per cent. of the total establishment charges. The percentage of 5·9 in Burma is again the highest, but this is probably due to the causes already mentioned. The figures for Bengal and for Bihar and Orissa are somewhat above the average and appear to us to call for comment; whereas in these provinces a chief engineer superintends only an average of 8 permanent divisions, in the Punjab and United Provinces a chief engineer superintends 22 divisions, and hence the necessity for two chief engineers in Bengal and Bihar seems to require further justification. The areas and expenditure per circle in these two provinces, especially the latter, are also below the average.

It has been suggested by some witnesses that the direction charges of the department could be substantially reduced, without loss of efficiency, by the abolition of the post of superintending engineer, the executive engineer 92(i).

being given larger powers and corresponding direct with the head of the department. We hesitate to support this proposal, which would throw an undesirable amount of work upon the chief engineer, to the detriment of the exercise of his proper functions of general control, but in view of the fact that the number of divisions per circle varies from 7 in Bombay to 3 in Bengal, we recommend that the question of the necessity for the full number of superintending engineers at present employed should receive careful consideration.

A further point to which we would draw attention is the small size and expenditure per sub-division in Bombay. A sub-divisional officer in that presidency has a charge extending over only 686 square miles, against an average of 1,349 square miles, and an expenditure of only Rs. ·82 lakhs against an average of Rs. 1·16 lakhs. The charges of these officers appear capable of expansion.

2. *Relations of the public works department with other departments of the administration.*

Reconstitution of divisions to coincide with the boundaries of civil administrative units.

46. Several witnesses have recommended that it is desirable to bring the public works department into closer relations with other branches of the administration, and particularly with the district administration. At present the executive engineer is *ex-officio* the professional adviser of all departments of the administration within the limits of his charge, but in other respects the department is more isolated than is usually the case with other branches of the administration, for example forests, education and the like. We do not accept the view that this is justified by the technical character of the work and that the operations of the department are less concerned with the ordinary affairs of the people. Even for the executive engineer to perform his duty as professional adviser it would be advantageous if the limits of his charge could be made to correspond with the boundaries of the civil administrative units. This is already the case in the United Provinces, where each district constitutes a sub-division, an average of three districts being combined to form a divisional charge; in the majority of cases, however, the limits of the division are determined more with reference to the nature and quantity of the work contained within it than to administrative convenience, but this latter factor deserves 26(i). some consideration. It has been recommended to us that every district should be provided either with an executive engineer or with a competent assistant engineer who would act as professional adviser to the civil head of the district in regard to all public works. We have considered whether such an arrangement is possible, but have come to the conclusion that, although it would have great advantages over the existing system, its introduction would in many cases involve additional expense and might prove impossible in provinces where irrigation and buildings and roads are under the management of a single staff, in which case the divisional boundaries must necessarily have reference to the irrigated areas. If our proposals in regard to the transfer of works to district boards are accepted the question will solve itself and hence we are unwilling to recommend any definite changes in the present arrangements during the transition period in view of the expense and dislocation

entailed thereby. But we advise that, wherever it can be done without difficulty or extra expense, the public works department charges should be so redistributed as to make them coincide, as far as possible, with the civil administrative units.

Position of the chief engineer as head of the department.

47. The chief engineer, under the system at present in force, is also secretary to the local Government or Administration, and is entrusted with very little power as head of a department, the whole control of public works being vested in the local Government. As chief engineer he has the power, when detached from the headquarters of a local Government, and subject to a report to that authority, to sanction the commencement of any urgently required work or repair up to a limit of Rs. 2,500; to sanction purchases of office furniture; to accept a tender up to the limit of the sanctioned estimate provided the amount does not exceed the power of acceptance of the local Government; to appoint, within sanctioned limits, office clerks, draftsmen and office servants; to grant leave to this establishment and to other officers if specially empowered to do so; and to dismiss any person appointed by himself or by any lower authority. Powers of technical sanction he has none nor, with the exceptions noted above, has he any power over the establishment of the department. If the code rulings were strictly followed he could not, without a reference to the local Government, transfer a superintending or executive engineer at all, or move a subordinate from one circle of superintendence to another. In a great number of cases the chief engineer acts without reference to higher authority, issuing his orders in the name of the local Government, but this fact does not, in our opinion, make the position any less anomalous. We recommend that the chief engineer should exercise the ordinary powers of a head of a department on his own authority, and be entrusted with adequate powers both in respect of the control of works and of establishment. In all technical matters, such as the grant of technical sanction to estimates, the purchase of tools and plant, the local purchase of European stores, etc., the powers at present exercised by the local Government should be vested in the chief engineer. The local Government should be concerned only with the general administration of the department; the chief engineer, by virtue of his office, should be responsible for its detailed control, and should be the final authority on technical matters.

14(i).

P. W. D. Code, Vol. I, para. 254.

Position of the chief engineer as secretary to government.

48. The question whether the chief engineer, who is also the head of a large spending department, should continue to be secretary to the local Government is one to which we have given careful attention. The public works department is the only department of which the head is also a secretary to government. The system is sanctioned by long usage, and this privilege is highly valued by the service and is said to be an attraction for recruitment. It is not, however, easy to say to what extent these views are prejudiced by the fact, referred to in the previous paragraph, that at present the chief engineer has practically no power at all in that capacity and that the large majority of his orders are therefore issued as secretary to the local Government. The position of the public works secretary in regard to his department

is in this respect different from that of any other secretary in regard to the professional departments included in his branch. In the former case the secretary actually controls the management of the department, in the latter he is not only responsible for showing, in each instance, how far the proposals of the head of the department concerned are in accordance with precedent and with the previously formulated policy of Government, but also how far they conflict with or conform to the interests of other departments. He is also responsible for securing the advice of the financial department in cases involving important expenditure and generally for presenting the case to the local Government with such complete information as to enable the head of the province to pass orders thereon. In cases where the secretary is doubtful whether the proposals of the head of the department can be accepted, on either administrative or financial grounds, it is usual (and in matters of importance should be the rule) to let the latter officer see the notes unofficially before the papers are submitted, and thus give him the opportunity either to explain away the difficulties or, as occasionally happens, to modify his proposals. The functions of the secretary are thus purely ministerial and advisory, and he is in no way, as some public works officers appear to imagine on the analogy of the present position of their own secretary, the administrative head of the departments with which he deals, the orders issued by him being, in actual fact as well as in name, the orders of the local Government. It is hence very questionable whether such secretarial work should form part of the duties of an engineer. An officer who is in the front rank of his profession may not infrequently be entirely unsuited for secretarial work, finding it irksome and distasteful, and both his professional work and the general
14(ii). administration suffer accordingly. It is urged that any change to the dual system in force in other departments would involve increased labour and waste, by requiring the work to be done twice over, and that public works matters are too technical for any outside control, particularly with the frequent changes made in secretariat appointments, with the result that the consistency and efficiency of the department's working would tend to suffer. But the force of these arguments is substantially lessened if the chief engineer is given the full and extensive powers which he should rightly possess as head of the department, for the number of cases requiring submission to the local Government would be much decreased and would consist almost wholly of such as, under the present system, he would have in any circumstances to prepare for the orders of the head of the province, whereas he would be saved a large amount of drafting and other ministerial work which at present devolves upon him, to the detriment of his professional duties. Moreover, looked at from the point of view of the public works department itself, it is questionable whether the position of its chief is not in some respects weakened by his appointment as secretary. In that capacity he ceases to represent his department and becomes the channel through which the orders of the local Government are communicated, and cases must inevitably occur when the orders which he is called upon to issue as secretary conflict with his views as chief engineer. As professional head of an important department he would occupy a more indepen-

dent position and would be able to press his views with greater force than he can as a secretary of the local Government. It is also the case that his secretarial duties interfere with his inspection work, preventing him from performing much touring, which we regard as an important defect of the existing arrangement. The main objection of the public works department, although not specifically stated, appears to be based upon the apprehension that the civilian secretary might usurp functions which he should not rightly possess, but this apprehension could suitably be met by giving the chief engineer regular and direct access to the head of the province or member in charge of the portfolio as has been recommended by the Public Services Commission in the case of directors of public instruction. **Public Services Commission Report, Annexure IV, para. 26.** This difficult question also requires consideration from a wider standpoint. The Decentralization Commission laid great stress on the danger of specialized departments pursuing their own course without reference to the views of other departments or to considerations affecting the people as a whole. **Decentralization Commission Report, para. 487.** We do not find that the public works department has avoided this danger in some important matters, notably in the attitude of some provincial departments towards private enterprise, which we have discussed in an earlier chapter of this report. In England the permanent heads of government departments are administrative officers and not experts, but experts are attached to the departments who advise upon points submitted to them. There is in England the further control by ministers, by parliament and by public opinion. In the present conditions of India the function of control of experts is also ordinarily exercised by a secretarial system manned by officers of general administrative experience and knowledge of the people and the country. The absence of such control is likely to lead to narrow departmentalism, and to it can be traced some of the complaints that the public works department is too isolated from the general administration. We do not accept the position that the public works department is concerned only with departmental efficiency ; it should possess a wider outlook as a department intimately connected with the industrial development of the country. **14(iii).** Only one local Government has suggested any change in the position of the chief engineer, from which it may perhaps be inferred that no great inconvenience is experienced in the practical working of the present system. Moreover, if public works are transferred to local bodies, the matter will right itself so far as the particular branch with which our inquiry deals is concerned, as when the public works department is constituted mainly as an inspecting and advisory body, cases must necessarily be submitted to government through the local and municipal departments, and the chief engineer will occupy his proper position as the professional head of the department. The majority of us (Mr. Sly, Sir Noel Kershaw and Mr. Cobb) consider the present arrangement unsuitable and believe that the separation of the chief engineership from the secretaryship would be in the interests, not only of the general administration, but of the department itself, but in view of the fact that time will give effect to our opinion and as the position is sanctioned by nearly sixty years of usage, as great importance is attached to it by the officers of the department, and in deference to the opinions of those of our colleagues who desire the continuance of the existing system, we prefer to make no recommendation on the subject.

Relation of the executive engineer to the head of the district.

49. Too much stress cannot be laid upon the desirability of a real and close co-operation between the executive engineer and the head of the district. The executive engineer is the professional adviser of the collector, and unless a close touch is maintained between these officers the interests of the district works are bound to suffer. We do not propose to lay down any definite rules defining this relation preferring, with the Decentralization Commission, to leave the matter to the discretion of the various local Governments, but we desire to refer to the complaints of aloofness and lack of co-operation which have been preferred by the members of other departments against the public works, and to suggest that local Governments should impress upon all executive engineers that their duties as professional advisers to all the departments of the administration within the limits of their charges should be discharged not only in the letter but in the spirit also. The position of an executive engineer is admittedly a difficult one, as he is the servant of many masters, it is often impossible to please everybody, and refusal to do so leads to accusations of departmentalism, but we are convinced that these complaints would largely disappear in the face of a more genuine co-operation between the executive engineer and the district officer, and of a realization that both are working with one common object in view. It has been suggested to us that the executive engineer should be required to submit his diary through the collector to the superintending engineer, thereby giving the former an opportunity of bringing to notice anything upon which he might desire to comment without the necessity for an official reference, but we do not consider that there is any sufficient reason for recommending the adoption of this proposal, more especially as an executive engineer's charge may extend into three or four different districts.

Decentralization Commission Report, para. 545.

52(i).

33(iii).

Preparation of projects on behalf of other departments.

2(iv). 50. We have now to deal with a complaint which has been raised by a number of officers of the public works department in regard to the large amount of infructuous work demanded from them by other departments of the administration in the preparation of projects that fail to mature. It is stated that, in requisitioning the services of the department for the preparation of designs and estimates, the requisitioning officers neglect to give sufficient consideration to the question of available funds for expenditure, with the result that there is a continual preparation and piling up of sanctioned projects in the department, to await provision of funds, out of all proportion to the allotments likely to be available within any reasonable period, and that long before funds are forthcoming many of these projects are either out of date or are no longer required. The result is that a very considerable amount of the energy and time of the public works department officers is uselessly absorbed. It was also urged that a great deal of unnecessary labour is thrown upon the department by the frequent changes in views of the officers of other departments, on whose behalf projects are prepared, between the initiation and completion of the works. The original plans are usually called for by the local

2(vii).

2(v).

officer of the department concerned, and preliminary line plans, with an approximate estimate, are made out; it often happens, however, that when these are submitted the head of the department does not agree with the local officer's views and modifies the requirements, and the preliminary plans and estimates have then to be drawn up afresh. Finally, when the executive engineer has satisfied both the local officer and his superior, the work may again be modified, or even thrown out altogether, by the local Government. Up to this stage however the work is merely in a preliminary state and, although these modifications absorb a good deal of time, even the officers of the public works department agree that there is no practical method of avoiding it altogether. What is condemned as the main flaw in the system is the procedure after the administrative sanction of the department concerned has been obtained, and the proposed work has been returned for preparation of the detailed plans and estimates for technical sanction. It is stated that frequently, owing to the failure of the departmental officer to examine carefully the preliminary plans, or to his failure to state his requirements in their entirety in the first instance, alterations and additions are demanded in the detailed drawings and that these modifications frequently necessitate new plans and estimates. The head of the department may have other changes to make and the process is repeated. In addition it frequently 2(vi). occurs that the departmental officers who approved of the preliminary plans are transferred before the detailed drawings are submitted, and their successors hold different views as to what is actually required. Finally it is alleged that even when the work is under construction the officers interested in it often desire alterations to be made not merely in the design but in the materials and class of construction also, thus involving the preparation of further revised estimates. It may thus happen that a work of no great magnitude may have to be designed several times before all authorities are satisfied, and it is to this procedure that the officers of the public works department attribute, in a large measure, the charge of dilatoriness often brought against them. The question of a suitable remedy is difficult; it is obviously undesirable that this duplication of work should be permitted to continue and yet it is equally undesirable that a department should be forced to accept a building which does not meet its requirements. The best solution appears to lie in the issue of executive orders to the effect that ordinarily, once administrative sanction has been given (and it may possibly be advisable to require the public works department to submit the preliminary plans in somewhat more detail than at present in order to render them thoroughly intelligible to a non-professional officer), no further alterations should be required, and that it should be considered as a reflection on an officer if he is found to be habitually making such alterations. In other words a much closer scrutiny of the preliminary proposals than is apparently sometimes accorded at present should be an important duty of the department concerned. We have considered the possibility of 2(viii). surcharging other departments with the cost of the preparation of these projects; the present system is obviously unsatisfactory as no charge is made and the expenditure involved goes to swell the general public

C. A. C., Vol. I, Art. 95.

works department establishment charges against works actually executed. It has, however, been pointed out to us that the buildings and roads branch is a "service" as opposed to a "quasi-commercial" department, and that no such charge is permissible unless a change of classification is introduced; we are not willing to recommend so drastic a measure and consider that it will be sufficient if the importance of a close scrutiny of the preliminary proposals, so as to obviate the need for subsequent alterations, be strongly impressed upon all members of departments which employ the agency of the public works department for the execution of their works, and if it be laid down that estimates shall not be demanded for any work unless there is every reasonable probability that funds for its construction will be available within a period not exceeding (say) three years. We would, however, suggest that the cost of the preparation of such projects for each department, calculated at the rates laid down by the Royal Institute of British Architects, together with the total of the construction estimates, should be tabulated in a statement for the information of government and the departments concerned, as in this way the local Government will have a ready means of ascertaining whether the cost of the preparation of projects for any particular department was out of proportion to the estimated value of the works.

Powers of administrative sanction possessed by civil officers.

P. W. D. Code, Vol. I, para. 649.

3(i).

P. W. D. Code, Vol. II, para. 1819.

61(i).

51. In the case of provincial works local Governments are authorized to give administrative sanction to any provincial work costing not more than Rs. 20 lakhs, and are empowered to delegate to officers subordinate to them such powers of administrative sanction as they may consider desirable. It has been stated in evidence before us that but little advantage has been taken of this permission, and that the powers delegated to civil officers are unnecessarily restricted, which entails frequent references to the local Government even in the case of small and unimportant works. In Bombay commissioners of divisions and heads of major departments can accord administrative sanction to provincial works other than residential buildings costing not more than Rs. 10,000, in the Central Provinces the limit is only Rs. 5,000, while in Bengal it is the same except in the case of the director of public instruction whose powers extend to Rs. 10,000. We consider that Rs. 5,000 is too low a limit and entails unnecessary references to higher authority, and we therefore recommend that commissioners of divisions and heads of departments should be authorized to give administrative sanction to provincial works excluding residential buildings up to a limit of Rs. 10,000. We further recommend that the limit for "minor works," *i.e.*, those which are provided for in the budget by means of a lump sum allotment for each service head, should be raised from the existing limit of Rs. 5,000 to the same figure of Rs. 10,000. At present the necessity for every work costing more than Rs. 5,000 must be foreseen some two years before its construction can be commenced, and consequently there is often undesirable delay in undertaking buildings which may be badly required and which, from the point of view of provincial finance, are of a comparatively unimportant nature. If these recommendations are accepted, we believe that a considerable portion of the delay which at present takes

place between the initiation of a project and its construction will be obviated.

Powers of public works department officers in regard to the budget allotments for works required for other departments.

52. Some officers of other departments have urged 75(i). that their requirements do not receive sufficient consideration in the preparation of the budget, where funds are allocated in the first instance to particular works, and also that the powers of the public works department to transfer funds from one work to another are too extensive, with the result that they never know whether a particular work in which they are interested is progressing or whether the funds provided for it have been transferred to some other work, and they have suggested that no such transfer should be allowed without a previous reference to the head of the department concerned. On the other hand the officers of the public works department 75(ii). are the only persons competent to decide whether it is possible to expend the full allotment upon any stated work, and references such as those proposed would lead to delays and consequent lapse of grants. We agree that the public works department must be the final authority in the matter, and are proposing in a later section that more extensive powers of re-appropriation be delegated to executive engineers, but to meet the views of the civil departments we suggest that the following procedure already in force in some provinces should be generally adopted. The allocation of funds in the public works department budget should be considered in the first instance by a committee, consisting of the financial secretary to the local Government, the chief engineer, the commissioners of divisions and the heads of the various departments most concerned. On the decisions of this committee, subject to the approval of the local Government, the budget estimate for the year will be based, and the allotments thus provided should be adhered to by the public works department as far as possible. The committee should also indicate the order of urgency of the works so included. Should the executive engineer find that during the course of the year he will be unable to expend the full allotment provided for any work, and decide to transfer the surplus to another work, he will take into consideration the order of urgency, and on making the re-appropriation will report the fact, with his reasons for so doing, both to the superintending engineer, who will immediately inform the head of the department concerned, and to the civil officer in charge of the district. In this way all interested parties will know what progress is to be anticipated on the various works.

3. *Specialist branches of the public works department.*

Recruitment and terms of service of specialist officers.

53. The specialist branches of the public works department are of comparatively recent origin, only nineteen years having elapsed since the first electrical engineer and sixteen years since the first consulting architect was appointed. Since that time there has been an ever increasing demand for specialists, and all the major local Governments now employ their own architects and electrical engineers. There has also in the last decade been a great development of sanitary work, and although in most provinces the sanitary engineership is held by a public works department engineer, borne on the regular cadre, there is a growing tendency towards the formation of a separate sanitary branch, under the

buildings and roads chief engineer, as has already been established in the United Provinces.

As must always be the case while a service is still in its experimental stage, no definite system of recruitment to these specialist posts has, in the past, been adopted. The officers of the architectural and electrical branches in their entirety, and of the sanitary branch in part, have been engaged by the Secretary of State on short term covenants and on varying scales of pay and conditions of service as the necessity for each appointment became evident. Some of these officers have since joined the permanent establishment on terms peculiar to themselves, while others have been re-engaged for further periods of years on revised agreements. There are thus at present a considerable number of such specialists in the department, all drawing different rates of pay, borne on no particular cadre, some permanent and some temporary, some pensionable and some non-pensionable, some subject to one set of leave rules and some to another, some subscribing to one provident fund, some to another and some to none at all. This disparity of treatment naturally gives rise not only to discontent on the part of individual officers but at times to considerable administrative difficulty, especially as no uniform system for regulating the terms to be granted appears to have been adopted in the past. We therefore consider it desirable to lay down definite conditions of service which we recommend should be made applicable to all future holders of specialist posts the permanent necessity for which has been satisfactorily demonstrated. 84(i).

Conditions of service proposed for specialist branches.

54. *Pay.*—The most satisfactory method of fixing the pay of these specialist officers is, we consider, to grant them the same rates, age for age, as sanctioned for the engineer service of the department. As there will be no promotion to administrative rank, as in the case of the engineer service, we propose a continuous time scale throughout, the officer's pay rising by five annual increments from the maximum pay of an executive engineer to the minimum pay of a superintending engineer, and by five further annual increments to the maximum pay of that class. The maximum pay of a superintending engineer is, we consider, a sufficiently high rate of remuneration for the duties required from a specialist officer. We do not, however, desire to suggest that every specialist officer should be allowed to rise to the maximum rate proposed above. The maximum pay to be allotted to each post should be separately determined with reference to the responsibilities involved and the amount and nature of the work entailed. It is, for example, obvious that the post of consulting architect in a large presidency should carry higher emoluments than in a small province. The maximum for each post, architectural, electrical or sanitary having been fixed, the officer appointed to it will draw the pay which, age for age, he would have drawn in the general engineering branch of the department until he reaches that maximum, after which further increments will be inadmissible.

Public Services Commission Report, Annexure XVIII, para. 27.

Leave.—In regard to leave we accept the general principles laid down by the Public Services Commission, *viz.*, that officers who, when they enter the department, are paid salaries at the higher rates specified for officers recruited in Europe should be subject to the European leave rules, while all others should be subject to the Indian service leave rules throughout their careers. We also endorse the Commission's recommendation that the rule prohibiting officers from taking furlough during the first eight years of their service should be annulled. This rule operates particularly harshly in the case of men who join government service after a period of employment in a private firm in this country. We further recommend that the public works department should be included amongst the services to which study leave should be admissible for further technical training and specialization under the recommendation made in paragraph 84 of the Commissions' report.

Public Services Commission Report, para. 79.

89(i).

Provident fund.—We do not recommend that these specialist appointments should be pensionable as there is always difficulty in adapting the pension system to services the officers of which are recruited at varying and often advanced ages. We consider that it is preferable to give such officers the benefits of a special provident fund, on the lines proposed by the Public Services Commission for the revenue establishment of the railway department, officers to subscribe one-twelfth of their salaries to the fund and government to add a bonus of 100 per cent., interest at the rate of 4 per cent. or such higher figure as the Secretary of State may determine being paid upon all subscriptions and bonuses thus accumulated. A provident fund of this nature has the advantage that it permits a man who desires to withdraw from government service and take up private practice to do so without incurring loss in the matter of prospective pension (and, as we have already pointed out, we consider that government should encourage the development of private enterprise in India), while on the other hand it facilitates the removal of officers whose work fails to give satisfaction or becomes stereotyped, a matter of great importance in the case of specialist services.

Public Services Commission Report, Annexure XIX, para. 16.

The above recommendations are of a general nature, and we shall now proceed to deal separately with each of the three main specialist branches and explain to what extent we consider that these general proposals should be made applicable to each.

Architectural branch.

Duties and responsibilities of the consulting architect.

55. Under the present system the consulting architect is, in all provinces except Bombay, a designer, and is not responsible in any way for the construction of buildings the plans for which are prepared in his office. In several provinces we were informed that he does, in practice, visit works during construction and gives the engineer in charge the benefit of his advice, but these visits are of an informal nature and involve no responsibility on his part. It is urged that in this way architects are cut off from one of the main functions of their profession, namely the supervision of the construction of their buildings, and that this divorcing of design from execution is inimical to the best interests of architecture in India, since design, if separated from construction, is apt to lose its vital relation to actualities, its touch with material and with the appropriate and economical use of it. It has also been urged that the efficiency of building work in general is reduced by inserting between the architect and the work an independent control which owes no allegiance or responsibility to the former, and that the Indian system is altogether opposed to the practice in force in more

17(ix)

17(vi).

17(ii).

17(iii)-(iv).

advanced countries, where the architect retains complete control during the construction of his works.

17(viii). In Bombay a somewhat different system has been adopted, the consulting architect being not only responsible for the design of important buildings throughout the province, but also in charge of the actual construction in the presidency town of all government buildings designed by him, with a special staff for this purpose. This arrangement has proved satisfactory and we have no doubt that the combination of design and execution under a single agency is desirable wherever it can be 11(i). obtained. It has been suggested that, to make such combination possible, the department should be divided into two separate branches, one undertaking the supervision of roads and the other that of buildings. We cannot however recommend a measure which would lead to so serious a duplication of staff, necessitating as it would two separate agencies in the same area, and we realize that it is impracticable to entrust to a special service of architects the construction of small buildings scattered over large tracts of country where an engineering staff must, in any case, be maintained. We consider however that it should be recognized that the supervision of building construction is an important portion of the duties of an architect, and we recommend that, in large centres such as presidency towns or other places where public works department divisions exist for building purposes only, and where it is probable that sufficient work of this nature will continue indefinitely, a staff of architects should be maintained and entrusted with the executive charge of the work, the cadre of engineers being correspondingly reduced. A similar arrangement should be made elsewhere when a building is to be constructed of sufficient importance to justify a separate sub-divisional charge.

17(v). A further point which has been raised is the relative responsibility, under the present system, of the engineer and the architect for the structural stability of works designed by the latter. In some provinces the architect is considered as being primarily responsible, in others as having no responsibility whatever. We consider that the architect should take the same responsibility for structural stability as is taken by an executive engineer in the case of projects prepared by him. It is the officer who prepares the designs in the first instance who is in the best position to detect engineering defects, and the fact that the estimate and plans have to be approved by the superintending or chief engineer should not be held to relieve him of his duty in this respect. Although these latter officers are required to satisfy themselves of the soundness of any project before giving their approval, it is impossible for them personally to examine and check every detail, and while they should undoubtedly be required to bear their full share of responsibility, the primary responsibility should rest with the officer who prepares the original plans, be he engineer or architect.

Terms of appointment of consulting architects.

56. The qualification for the post of consulting architect should, in our opinion, be a fellowship of the Royal Institute of British Architects, and candidates should, in the first instance, be recruited as at present on five-years' agreements, and on a scale of pay equal to that drawn by an officer of the civil engineering branch

of the same age. On the expiration of his covenant, provided the officer concerned has proved satisfactory and that there is sufficient work to justify the appointment of a permanent whole-time architect, he should be transferred to the permanent establishment on the terms enumerated in paragraph 54 of this chapter. During his five years' probation he should be permitted to subscribe to the special provident fund and his service during this period should count for leave in the event of his being confirmed in his appointment.

Terms of appointment of assistant architects.

57. The qualification for the post of assistant architect should, we consider, be a fellowship or associateship of the Royal Institute of British Architects, provided, in the latter case, that the candidate has in addition served for at least three years with a practising architect in Europe. In regard to the conditions of service of these officers we are not unanimous. The majority of us favour the present system of successive five years' agreements, with pay and provident fund on the same scale as recommended for consulting architects, on the grounds that this arrangement may result in inducing men, on the expiry of their agreements, to settle down in private practice in India, that it will ensure the periodical introduction of new blood and new ideas, that it will avoid the administrative difficulties which are inherent in a small cadre of permanent officers all of whom not unnaturally consider that they have a direct claim upon the higher posts, and finally that it will obviate the danger of the recruitment of a larger permanent staff than will be required if effect be subsequently given to our recommendations regarding the transfer of work to district boards. Our President, however, considers that satisfactory recruits will not be secured on five years' agreements with no right of renewal for even approved service, because no promising architect will sever his European connection for such temporary prospects; that experience of temporary appointments of specialists in other services has proved it to be unsuitable for India; and that the best hope for the establishment of an indigenous school of architecture in India lies in the formation of a permanent service identified with the country. The majority of us are of opinion that the balance of advantage lies in recruiting assistant architects on short term covenants as their services are required, dispensing with them or extending their engagements on the completion of each agreement. We are all agreed that the ultimate aim should be the recruitment of architects in India, as soon as suitable candidates can be obtained, and towards this end we recommend later on (paragraph 85) the immediate establishment of a good school of architecture in Bombay.

Consulting architect to the Government of India.

Decentralization Commission Report, para. 207 (iii).

58. The Royal Commission on Decentralization dealt with the position of the consulting architect to the Government of India. Prior to that time all local Governments with the exception of Madras, Bombay and Bengal were required to send to the Government of India, for the approval and criticism of the consulting architect, the designs for all public buildings the cost of which was beyond the local Government's power of sanction or which were estimated to cost more than Rs. 50,000. The Decentralization Commission recommended that the monetary limit should be abolished, and that it should be left to local Governments to apply to the consulting

architect to the Government of India in cases in which they considered his advice desirable, and effect was given to this recommendation in 1909. Since then all the major local Governments have entertained their own consulting architects, and the number of detailed plans submitted to the Government of India has consequently greatly diminished, the powers of the major local Governments to accord technical sanction to estimates having also been raised to Rs. 20 lakhs in the case of provincial works and Rs. 2½ lakhs in the case of imperial works, including in both cases departmental charges for establishment and tools and plant. This latter limit has again been raised, in the present year, to Rs. 20 lakhs, and consequently the number of projects which will in future be submitted by major local Governments to the Government of India will be very small.

18(i). The consulting architect to the Government of India has suggested to us in his evidence that it would be advantageous to government to entrust him with the design of all imperial works, such as post and telegraph offices, customs houses, etc., costing more than Rs. 2½ lakhs on the grounds that an officer at the imperial headquarters is more in touch with the heads of imperial departments and that local Governments are apt to subordinate economy of design to the desire to obtain, at imperial expense, a building which will be an ornament to the locality and a credit to its designers. We are unable to accept this proposal, which strikes at the whole root of decentralization by assuming that local Governments are less careful of imperial than of provincial funds. With the appointment of provincial architects decentralization was inevitable, and we consider that, in a matter such as architecture, interference by the Imperial Government with local Governments is unnecessary. With the development of provincial autonomy the reasons which rendered it necessary for the Government of India to retain an architect are rapidly disappearing, and we are of opinion that the appointment is only justified for so long as the work received from minor administrations and other departments is sufficient to afford employment for a whole-time officer.

Sanitary branch.

Organization of the sanitary branch.

59. Hitherto no separate sanitary service has been formed as a branch of the public works department, the posts being filled ordinarily by officers of that department, who may or more usually may not have any specialized training in sanitary engineering. A proposal has been made for an imperial sanitary service, liable to service throughout India, the members of which should be deputed to the different provinces. The strength of such a service has been estimated at 29 officers, with an ultimate number of 38 allowing for future expansion and leave vacancies. Against this proposal it has been urged that the administration of so small a service would present serious difficulties, that promotion would be irregular, that the dual control between imperial and provincial would be objectionable, and that to ensure anything like regularity of promotion would necessitate constant interprovincial transfers of deputy sanitary engineers to fill the sanitary engineerships as they fell vacant. It has also been urged that good officers would be deterred from joining such a branch,

because they would be unable to aspire to the highest posts of the department, and that the formation of such a service would involve the maintenance of a staff of experts employed solely on design, with no practical experience of construction under Indian conditions. Finally it has been postulated that, as it has proved unnecessary to recruit separately for irrigation and railway work, there is no reason why an exception should be made in the case of sanitary engineers. These arguments are directed mainly against three of the proposed conditions of service, namely, that it will be an all-India service, that recruitment will be of junior officers for training in India, and that the staff will be maintained for design only, construction being entrusted to the general branch. The recommendations we are about to make involve however none of these, and consequently we believe that most of the objections stated above are not applicable. We are convinced that the time has come to provide India with a staff of sanitary experts with specialized training and able to devote their energies, to the exclusion of all other work, to the building up of a thoroughly organized scientific system in co-ordination with the results of European research. We deprecate, however, any idea of an imperial service, and recommend the formation of a branch on similar lines to that proposed by us for the architects, consisting in each province of a sanitary engineer and a number of assistant sanitary engineers, recruited specially for the purpose on the system detailed in the next paragraph, and responsible not only for the design, but also for the supervision of construction, of major sanitary projects. The fact that the chief engineership will not be tenable by officers of this branch will not, we consider, deter the right class of man from entering, any more than it has done in the case of the architects. We realize the difficulties involved in the administration of a very small cadre, but our recommendation that the sanitary branch shall undertake the construction of its own works will entail a larger staff than that hitherto contemplated. It would, in our opinion, be wrong in principle to entertain an establishment of experts for design alone; it is essential, as we have already explained in regard to the proposed architectural service, that design should go hand in hand with local knowledge and with the economical and appropriate selection and use of the labour and materials available. We would make it clear from the outset that officers recruited as assistant sanitary engineers have no claim upon the post of sanitary engineer; when that post falls vacant the local Government concerned will have the choice of three alternatives—to promote an assistant sanitary engineer on its own establishment, if a suitable officer is available, to obtain a recommended assistant sanitary engineer from another province or to recruit an outsider specially for the post. We do not consider that, on the scale of pay and conditions of service which we propose, there will be any lack of suitable candidates for the lower posts.

As regards the argument that it is no more necessary to recruit specially for the sanitary branch than it is for the irrigation or railway branches, it appears to us that the cases are in no way parallel. India is probably the finest school in the world for an irrigation engineer, and it would obviously be anomalous to import into India irrigation experts trained elsewhere, and similarly India can compare with any European country as a field for training in railway engineering. But with sanitary engineering the conditions are very different. Sanitary science is still in its infancy in India and to rely on that country as a training ground would mean the risk of a stereotyping of ideas and failure to progress in line with the results of modern research. It is probable that it will be many years before India can compete with Europe as a school for sanitary engineers.

Another argument advanced against the proposed sanitary service is that it is not every young engineer who has the tact and patience required in dealing with local bodies, that to keep such an officer in the service would have serious disadvantages while to return him to England would speedily affect recruitment, and that it would be distinctly advantageous to be able to transfer an engineer, temperamentally unsuited to the sanitary service, to the general branch of which, under quite different conditions, he might prove a most useful member. We are not impressed by this argument. The position of the public works department engineer as professional adviser to the district officer necessitates a close touch between the former and the various local bodies of the district, and if the former lacks the tact and patience necessary for the sanitary service he is likely to be unsuited for employment in any branch of the department.

Recruitment of sanitary and assistant sanitary engineers.

79(i). 60. Under the present system the majority of the sanitary engineers are officers drawn from the general branch of the public works department, only three officers having been specially recruited for the post. The sanitary engineerships are usually borne on the cadre of superintending engineers, and there are indications in some provinces that officers have been appointed to the post of sanitary engineer rather because they were ripe for promotion to administrative rank than because they possessed any special qualifications for sanitary work. We do not consider that this system is satisfactory. As we have already stated, sanitary engineering is a highly specialized branch of the profession, and in our opinion specialists should be recruited for specialist posts. We recommend that, in future, posts in the sanitary service should be filled by officers recruited specially for the purpose, the main qualifications being that candidates should have a sound practical training on sanitary works and should be conversant with the latest developments of modern sanitary science. We
79(iii). consider that this is of more importance than previous Indian experience, upon the necessity for which much
79(ii). stress has been laid by certain witnesses. If, however, a public works department officer undergoes special courses of study and obtains adequate training, we would not debar him from appointment, provided he is willing to be transferred definitely to the cadre of the sanitary service, and to take his place upon the time scale laid down for specialist branches. Such an officer should, however, retain his claim to pension and should not be admitted to the benefits of the special provident fund.

For sanitary engineers specially recruited we recommend that they should be engaged on probation on a five years' agreement in the first instance, on the pay which, age for age, they would have drawn had they entered the general branch at the age of 23, and that thereafter, if proved to be satisfactory, they should be brought on the permanent establishment on the salary and conditions of service laid down in paragraph 54. We do not think that the reasons advanced against the permanent employment of assistant architects apply so fully to assistant sanitary engineers and we consider that they also, after completing satisfactorily a period of five years' probation, may be brought on the permanent staff. Once again we do not desire to lay down the maximum pay within the scale to which either the sanitary engineer or his assistants should be allowed to rise, which should vary from province to province and should be fixed strictly in accordance with the duties and responsibilities of each particular post.

Relation of the sanitary engineer to the chief engineer.

61. In all provinces except Bengal and Bihar and Orissa the sanitary engineer is directly subordinate to the chief engineer; in Bengal and Bihar he works directly under the branch of the general secretariat which is responsible for local and municipal affairs. We favour the former system and consider that, like the architectural and electrical experts, the sanitary engineer and his staff should be members of the public works department and thus be under the general control of the chief engineer. 79(vii).

Electrical branch.

Functions of electrical engineers.

62. Every major province now employs its own electric inspector, and in Bengal and Bombay a second electrical engineer is entertained in addition. The main function of the electric inspector is to carry out statutory inspections under the Indian Electricity Act, while in all provinces except Bombay he is also adviser to the local Government in electrical matters; in Bombay this latter duty is performed by the second electrical engineer. 36(i). The second electrical engineer in Bengal is the executive officer in charge of the so-called electrical division. 36(ii). This division was formed temporarily in 1908 to undertake both original and maintenance work in connection with electrical installations in public offices and buildings in Calcutta which had, prior to that year, been entrusted on contract to private firms, and in 1913 was reconstituted on a permanent basis; the officer in charge has no statutory duties, his work being of a purely executive nature. The second electrical engineer in Bombay is, as already stated, the responsible adviser of Government, and in addition erects and maintains all electrical installations pertaining to government buildings throughout the presidency. While we recognize the necessity for an electric inspector in each province, we are not convinced that the appointment of a second electrical engineer is justified. The work of the electrical division in Calcutta consists mainly of installation and repair work such as a private owner invariably gives out to a reliable firm. Considering the extent to which electricity is used in Calcutta it is obvious that reliable agencies for the execution of such work exist, and it is very doubtful whether government is justified in maintaining an expensive establishment for the purpose. The same remarks apply equally to Bombay. If the advisory duties, at present entrusted to the electrical engineer, are transferred to the electric inspector, we consider that the balance of the work, consisting mainly of the executive charge of small installations, could be taken over by a less highly trained and highly paid agency. This executive work does not, in our opinion,

require the appointment of officers of the attainments of the present incumbents, and the maintenance of divisions such as that in Calcutta is detrimental to the legitimate claims of private enterprise. We therefore recommend that each province should confine itself to the employment of a single electrical expert, who should combine the duties of electric inspector and adviser to the local Government, all work except *bonâ fide* maintenance being entrusted to private firms where such are available. For the small amount of pure maintenance work which will remain a much less highly skilled agency will suffice.

Recruitment and terms of service of electrical engineers.

63. Electrical engineers appointed to the department should possess an electrical or mechanical engineering degree and also considerable previous practical experience of electrical work and be fully qualified to act as advisers to government. They should be recruited on the same terms as consulting architects and sanitary engineers, namely on a five years' covenant in the first instance and thereafter, if found suitable, brought on the permanent establishment on the scale of pay and conditions of service enumerated in paragraph 54.

Electrical adviser to the Government of India.

64. The exact position and responsibilities of the
electrical adviser to the Government of India are by no
38(i). means clearly defined. The administration of electrical
matters was decentralized by the Indian Electricity
Act of 1910 to such an extent that practically the only
power remaining to the central Government is that of
making rules under the Act. In the circumstances the
necessity for an electrical expert at imperial headquarters
is not evident. He possesses no statutory functions
and local Governments are not required to apply to him
for advice. In 1916 the Government of India issued
a circular which laid down that local Governments were
free to consult him should they desire to do so, and which,
while authorizing him to tour in the various provinces,
with the exception of those which signified that they
did not wish him to do so, debarred him from making
official inspections or from submitting inspection notes
except at the special invitation of the local Government.
We consider that the position of an imperial expert who
can be (and we understand in the case of one local Govern-
35(iv). ment has been) requested to refrain from visiting any
province, and who may at the best only "visit" but
may not "inspect," is anomalous. Our inquiry shows
35(v). that, so far as local Governments are concerned, there
appears to be no justification for the appointment, and
it would probably be more convenient for minor Ad-
ministrations which maintain no electrical engineer of
their own to call upon the services of the inspector in
the nearest province rather than upon the electrical
adviser to the Government of India. Certain instances
have been referred to in which the interests of supply
companies have been found to be in conflict with those
of the local Government and it has been suggested that
35(iii). the electrical adviser's counsel is of great value in such
cases, but the right of appeal from the local Government's
decision to the Government of India under the Act is
somewhat indefinite, and in any case we consider that
matters of this nature could more appropriately be re-
ferred to a private consulting electrical engineer appoint-
35(ii). ed *ad hoc*. Another branch of the activities of the
electrical adviser upon which stress has been laid is the

chairmanship of the annual conference of electric inspectors, and the preparation, for the orders of the Government of India, of the various questions discussed. We are not in a position to decide to what extent this preparation is necessary, or to what extent Government could, without further expert advice, accept the recommendations of the majority of the provincial inspectors. It seems to us, however, that there is not work enough for a whole-time officer, and that most of the questions referred to the electrical adviser could be settled by consultation from time to time with a qualified outside expert. Possibly no such expert is available in India at present, and hence the Government of India may desire to retain their own adviser, but we recommend that the matter should be reconsidered before another incumbent is appointed permanently to the post.

Further specialized branches.

Necessity for further specialization in the public works department.

65. Several witnesses have stated their opinion that further specialization in the department is desirable, particularly in the case of bridge building and mechanical engineering. In favour of the former suggestion it has been urged that, under the present system, an officer is called upon to design and construct perhaps one large bridge in his career, and is hence necessarily handicapped, whereas greater economy and efficiency would be obtained by the employment of a specialist to undertake all major bridge work. We are unable to support this proposal; bridge design and construction are part of the ordinary work of the civil engineer, and the introduction of a specialist would merely lead to further duplication of staff. A local Government can always, if it so desires, transfer to a district where large bridging projects are contemplated an officer with previous experience of such work, and we consider that this is a better and more economical solution than the creation of a specialist branch. 86(i). 84(iii), 57(i).

In regard to mechanical engineers, it appears that the services of such officers are required not in connection with government work but with the mechanical installations and pumping plants belonging to municipalities. This being so, we are averse to the formation of yet another specialist branch of the department for the purpose, and consider that it would be preferable, where such an expert is necessary, to encourage municipalities either to combine together to employ a mechanical engineer if sufficient work exists in the province for a whole-time officer or, if not, to contract with a reliable firm for the periodical inspection and repair of their installations.

Introduction of European quantity surveyors, clerks of works and foremen.

66. It has also been suggested that the work of the department would be improved by the introduction from Europe of trained quantity surveyors, clerks of works and foremen or master craftsmen in some branches of the building trades. This proposal also we are unable to accept. Not only are grave difficulties always inherent in the importation of European subordinates into India for any service in which only a small number are required, but we are by no means convinced that it is really necessary. It appears to us that progress can be made by a better training of the material available in India and particularly by improving the teaching of estimating in the engineering colleges and the training of foremen in the technical schools. We are opposed to any further increase in the Europe-recruited 74(i). 15(i). 45(i).

staff of the department, especially in the subordinate ranks. We recognize that progress in the present low standard of several branches of the builder's trade is desirable, but believe that it can be better secured by insisting on gradually increasing standards of work under the supervision of architects and engineers.

4. *Improvements of procedure.*

Public works department accounts.

67. During our investigation a number of officers of the public works department have stated in evidence that the system of accounts and audit at present in force 1(xv). in the department is unnecessarily complicated, and that their accounts work is so heavy as to interfere seri- 1(xi). ously with their executive duties. After an examination of the existing procedure we agree that the executive engineer is required to devote too much time to his accounts and we recommend that steps should be taken to relieve him of the work of compilation, leaving him responsible only for the record of the initial transactions, and for the preparation of such statistics as are necessary either for his professional purposes or for the maintenance of adequate control over his expenditure. Our detailed recommendations on this subject will be found in Part I of Appendix B.

Decentralization.

68. Under the existing system the powers of the various classes of officers of the public works department are, in our opinion, unnecessarily restricted, thereby extending the chain of responsibility, even in comparatively unimportant matters, to an undesirable degree, and we are convinced that the fact that officers are not allowed to exercise powers commensurate with their skill and experience has reacted unfavourably upon the efficiency of the department. To the same fact may probably be attributed part at least of the delay which at present often occurs in the commencement of works. We have already proposed that the powers of professional sanction now possessed by the local Government should be vested in the chief engineer, and we recommend that the corresponding powers of both superintending and executive engineers should be materially enhanced. We also recommend that limited powers of professional sanction should be delegated to sub-divisional officers and that both superintending and executive engineers should be given increased powers of control over the staff employed within their jurisdictions. Our recommendations are detailed in Part II of Appendix B.

Public works department code.

Decentralization Commission Report, para. 229.

69. The Decentralization Commission recommended that the provisions of the public works department code should be confined to rulings necessary for general application in the interests of imperial finance and control and that the idea of making it an official *vade mecum* for engineer and accounts officers throughout India should 16(i). be abandoned. Many witnesses have represented the difficulties of working caused by the numerous restrictions of this code, but as we understand that it is in process of revision on the lines indicated by the Decentralization Commission, it appears unnecessary for us to make any general recommendation on the subject. Certain specific rules have, however, been brought to our notice in which we consider that modification is desirable, and these are dealt with in Part III of Appendix B.

Intercommunication between provinces in regard to works.

70. During our investigation we have had occasion to notice the apparent lack of intercommunication between provinces in regard to works. While realizing that considerable differences must necessarily exist between the rates in force and materials and specifications in use in the various provinces, it appears to us probable that economy could be effected by a more general interchange of information. There are wide differences, for example, between the standard plans adopted for the same class of buildings, differences too marked to be attributed merely to different climatic conditions, with the result that apparently, if the accommodation provided in one province is adequate, that provided in another is extravagant. We therefore advocate an increased interchange of information between the provinces such as that represented by standard plans, specifications, analyses of rates and the like, in order that each province may obtain the benefit of the experience of its neighbours, and thus enlarge the data available for the preparation of its own designs and estimates.

CHAPTER VI.

ENGINEERING EDUCATION.

The four major engineering colleges.

71. We now proceed to deal with the last of the subjects referred to us, namely the adequacy of the education imparted at the government engineering colleges.

There are four major engineering colleges in India, the Thomason College at Roorkee in the United Provinces, the Sibpur College near Calcutta, and the colleges at Madras and Poona. Each of these institutions is independently administered under the orders of the local Government within whose jurisdiction it lies, and for educational purposes the three last named are affiliated to the universities of their respective presidency towns. Three grades of education are imparted at each college, adapted respectively to the needs of engineers, upper subordinates and lower subordinates. We inspected all four institutions, and in addition to hearing the evidence of the principal and selected members of the staff, we held conferences at Poona, Sibpur and Roorkee, where we discussed with the staff of professors the more important issues arising from our inquiry. We confined our detailed attention to the civil engineering branches of these colleges.

Proposal to establish a single engineering college.

72. It was suggested that the maintenance of four colleges, each attempting to teach up to the highest standard, is in advance of the needs of the country and involves a dissipation of strength, and that it would be advantageous to centralize the more advanced engineering education in a single imperial college where a higher course could be given, leaving to the remainder the production of a lower grade of engineer. This proposal was considered by the Public Services Commission, who recorded the opinion that the objections to such a scheme were far stronger than any arguments that could be adduced in its favour. Not only did it appear to them that a single college would be inadequate to deal with the ever increasing number of engineers required by government, native states, municipalities, local boards

13(i).

Public Services Commission Report, Annexure XVIII, para. 14.

and private firms, but they considered that it would tend to attract students mainly from the neighbouring provinces, and that the advancement of engineering science in more distant provinces would suffer accordingly. We agree with the Commissioners that the balance of advantage lies on the side of retaining the four existing colleges, each organized so as to be capable of teaching up to the highest standard, and are convinced that the centralization of higher engineering education would be a retrograde step and would affect adversely the industrial development of India, with which development the demand for engineers is certain largely to increase.

Constitution of an imperial advisory board.

5(i). 73. An alternative recommendation made to us is that the control of the four existing colleges should be centralized in the Government of India and an imperial advisory board constituted, which should pay visits of inspection at stated intervals, examine and report on the procedure and courses of study, and generally tend to reorganize the colleges as four branches of a single institution. We do not, however, consider that there is any necessity for such centralization. We recommend, in the following paragraphs, more uniformity between the different colleges in certain matters such as age limit at entrance, length of courses, etc., but we consider it preferable that, in other respects, the management and administration of the colleges should remain with the local Governments concerned, who are the best judges of local requirements.

Present arrangement of classes at the four colleges.

74. The following is the present arrangement of classes at the four major colleges.

(*a*). *Roorkee.*—There are three classes in civil engineering at the Roorkee college, the civil engineer class, the upper subordinate class and the lower subordinate class. The course for the civil engineer class extends over three years, that for each of the subordinate classes over two years, and in all cases admission is by entrance examination, subject to the production of satisfactory certificates of health and character and, in the case of the first two classes, to the possession of certain specified educational qualifications. There is also at Roorkee a department of technology, divided into classes in textile and in mechanical and electrical engineering, as well as classes for mechanical and industrial apprentices.

(*b*). *Sibpur.*—The college at Sibpur is divided into two main departments, the engineer department which prepares students for the Bachelor of Engineering degree of the Calcutta University, and the apprentice department for the training of subordinates. The course of study in the engineer department extends over four years, the first two years' courses being common to all students; thereafter they select the particular branch of engineering, civil, mechanical and electrical or mining, in which they propose to appear at the Bachelor of Engineering examination, and the courses bifurcate accordingly. The four years in college are followed by a year of practical training on works, and although the Bachelor of Engineering degree is awarded purely as a result of the theoretical training, the college diploma is not granted until the year's practical work has been satisfactorily performed. The full course of instruction in the apprentice department extends over five years, during the first three and a half of which the instruction is given at the college, the last year and a half being spent entirely in practical training either in works or in the college workshop. Every apprentice passing the examination held at the end of the second year is entitled to a certificate stating that the holder possesses the theoretical qualifications required of a sub-overseer in the public works department, while those passing the final examination held at the end of three and a half years are entitled to a third grade overseer's certificate. On the completion of the full five years' course the apprentice is entitled to either a sub-engineer's or an upper subordinate's certificate, according to the marks obtained. A proposal has however lately been submitted to the local Government to separate the classes for upper and lower subordinates, and to introduce two distinct courses, one of three years for the former and one of two years for the latter. Classes in mining and in mechanical and electrical engineering are also attached to the apprentice department, the courses in these subjects extending over three years, the college diploma being awarded to successful students at the end of the third year. In addition to the above classes boys, preferably the sons of artisans, are admitted for training in the college workshops as carpenters, blacksmiths, fitters, etc.

(*c*). *Madras.*—The Madras college contains an engineer class for the training of civil and mechanical engineers, an upper subordinate class, a lower subordinate class and a probationary subordinate class. The course of instruction in the engineer class extends over five years, of which four are spent in college and the fifth on works; the Bachelor of Engineering degree of the Madras University is not awarded until the students have performed satisfactorily their year of practical training. The students of civil and mechanical engineering follow the same course of study for the first two years, after which the courses bifurcate. All students taking the subordinate courses commence in the probationary subordinate class, and remain in it for two years. At the end of that period a certain number of students are promoted into the upper subordinate class, the course of instruction in which extends over three years, of which two are spent in college and one on works. The remainder pass into the lower subordinate class where they study for a further period of one year.

(*d*). *Poona.*—There are three separate branches represented at the Poona college, *viz.*, the civil engineering, the mechanical engineering and the apprentice branches, the last mentioned being sub-divided into three classes, for sub-overseers, mechanical apprentices and electrical apprentices respectively. The civil engineering course was, until the present year, common to both engineers and upper subordinates, the course of study extending over three years, at the end of which the students appeared at the Bachelor of Engineering examination of the Bombay University. The mechanical and civil engineers took the same course for the first year, bifurcation taking place at that stage. Sanction has, however, lately been obtained to the sub-division of the civil engineering branch into two courses, the higher course extending over four years during which students will be prepared for the Bachelor of Engineering examination, and the lower course, which will be of a more practical nature, lasting for three years only, and entitling the student to a college diploma. The course for sub-overseers extends over three years, and the syllabus is separate throughout from that prescribed for the mechanical and electrical apprentices.

Arrangements recommended.

75. From the above description it will be seen that education in civil engineering is generally divided into three grades, engineer, upper subordinate and lower subordinate. In our proposals regarding the reorganization of the public works department we have advocated the abolition of the present upper subordinate class, and the retention of only two classes, engineers and subordinates. We recommend that the same principle should be applied to the engineering colleges also, since the upper subordinate appears to us to be an undesirable compromise between the engineer officer and the subordinate proper, and we believe that not only government, but public bodies and private firms also, would be better served by an engineer trained and recognized as such. There should, we consider, be only two departments of civil engineering in each college, for the training of officers and subordinates respectively, the engineers for both the superior and provincial government services, as also the district engineers contemplated in our reorganization scheme, being drawn in general from the former class. We recognize that there are objections of principle to the present system under which engineers and subordinates are trained together in the same institution and, while recognizing that no change may be possible in the immediate future, we consider that when the demand for engineers justifies the step the ultimate policy of government should be to eliminate all forms of subordinate education from the colleges and to provide for them in technical schools. 39(v).

Conditions of entrance to the engineering colleges.

76. (*a*). *Engineers.*—The educational qualifications prescribed for entrance to the civil engineering courses of the four colleges vary considerably. Candidates for Roorkee are required to pass a competitive entrance examination, the qualification for admission being a Bachelor of Arts or Bachelor of Science degree of an Indian university, a school leaving certificate with certain subjects, or some equivalent qualification. Sibpur and Madras accept the intermediate arts or science standard of the universities provided that certain specified groups of subjects have been taken and, in the case of Sibpur, that the candidate passes a special drawing test, while at Poona a certificate from the principal of an affiliated arts college to the effect that the student has carried out satisfactorily the work appointed by the university for the first year after matriculation, with distinction in certain subjects, is recognized as sufficient. There is no entrance examination at Sibpur, Madras or Poona, selection being made by the principal if the number of candidates exceeds the number of vacancies. The maximum age-limits laid down for entrance are 21 on the 1st June preceding the entrance examination in the case of Roorkee, 22 on the 1st January of the year of admission for Bachelors of Arts or Science and 20 on the same date for others in the case of Sibpur, 19 on the 30th of June of the year of admission in the case of Madras, while at Poona no age limit is prescribed.

(*b*). *Subordinates.*—To qualify for appearance at the entrance examination for the upper subordinate class at Roorkee, candidates must have passed the matriculation examination of the Punjab University or the school final examination or possess some equivalent qualification. No educational qualifications are prescribed for the competitive entrance examination for admission to the lower subordinate class. The matriculation standard is accepted at Sibpur, the matriculation or school final examination at Madras, and the school final examination at Poona. In the case of Sibpur, students of certain affiliated *zilla* schools who have taken a two years' course in the so called B class at those schools are eligible for admission to the second year class of the apprentice department, while candidates from affiliated technical schools may, if accommodation is available, be admitted direct into the third year class. The maximum age limits at entry are 22 on the 1st June preceding the entrance examination for upper, and 21 on the same date for lower subordinates at Roorkee, 17 last birthday at Sibpur, 19 on the 30th June of the year of entrance at Madras while at Poona no age limit is prescribed.

Recommendations in regard to age limit and educational qualifications

77. (*a*). *Engineers.*—There is considerable diversity of opinion among the witnesses who have given evidence before us as to the correct age at which a student should commence his specialized education in engineering. Those who favour the adoption of a high age limit urge 39(i). that students should not be debarred from taking their Bachelor of Arts or Science degree (upon the possession of which Indian opinion lays great value) before admission to the engineering college, and that the four years at an arts or science college ensures a good general education, including a sound grounding in mathematics. It is also urged that this secures a higher standard of knowledge of the English language, and so enables Indians to compete on more equal terms with students whose mother tongue is English but who are usually not so forward in mathematics as the university graduates. Stress was also laid on the fact that Indian parents usually postpone the decision as to their sons' future professions till the latest possible moment, with the result that the fixing of a low age limit would exclude many candidates who at present do not decide to take up engineering till towards the end of their university course, and so narrow undesirably the field for selection. In favour 39(ii). of a low age limit it is urged that it is to the benefit of the student to bring him into the atmosphere of his future profession as early as possible, and that there is a danger, if he spends four years at an arts college, of his acquiring sedentary and literary tastes which may unfit him for the work of an engineer. A low age limit will, it is also suggested, bar the admission of students who, having commenced their university course with the intention of entering a literary profession for which a degree is essential and having no real bent for engineering, find themselves unable to pass their final examinations and so fall back on engineering merely as an alternative method of earning a livelihood. The majority of us (Mr. Sly, Sir Noel Kershaw, Messrs. Cobb and Mackenzie) consider that the balance of advantage lies on the side of adopting a low age limit. Especially in the case of Indian students, whose early environ- 49(i). ment is usually unfavourable to the development of manual training, we consider it desirable that they should commence their specialized training, and particularly their workshop training, as soon as possible after the completion of a general school education. We should

have preferred to adopt the school-leaving stage and thereafter even to include, if necessary, a certain amount of general education in the engineering colleges, but we
56(i). are assured that the matriculation standard is so low, especially in some provinces, that the imparting of such general education would throw an undue strain upon the staff of the engineering colleges and that the knowledge of English connoted by it is inadequate to enable students to follow any but the most elementary courses of technical instruction in that language. We therefore recommend that the qualification for entrance should be the inter-
39(iii). mediate standard of an Indian university, with English, mathematics, physics and chemistry as compulsory subjects, or such European school standard as may be recognized as equivalent, certificates of character and health being also required. Selection should then be made from among the qualified candidates by means of an entrance examination in the four subjects mentioned above, by English being understood modern English, including a short essay and an oral test. We recognize that there is an educational objection to this system, in that the colleges teaching science will be educating boys in the same classes but with two different objects in view, some taking the intermediate examination as a preliminary to their degree, and some as a qualification for admission to the engineering college, and we have considered the alternative of prescribing a competitive entrance examination in general educational subjects, including those specially allied to engineering, without insisting upon any preliminary educational qualification. It appears to the majority of us that there are still more serious objections to this course. Not only would it prove uneconomical and undesirable, as rejecting the existing educational machinery of the country for testing the general education of candidates, but it would inevitably lead to the substitution of systematic " cramming " for the period now spent in the acquisition of a general education, and to the establishment of special coaching institutions for the purpose, and such a system would, in our opinion, be opposed to the best interests of the engineering profession.

We are convinced that the present age limits are
83(i). fixed too high. At Sibpur, for example, a student can join the college at the age of 23 years and 10 months (the course begins in November), spend six years in college, two failures being allowed by the rules, spend one year on practical training and thus gain his college diploma at the age of 31. We recommend that the age at entrance should not exceed 19 last birthday, which allows three years from the date of matriculation and permits, if necessary, of one failure in the intermediate examination. We realize that the age limit proposed definitely debars holders of university degrees,
100(i). and it has been stated that this fact will cause the best class of candidate to refrain from taking up engineering, but we are not convinced of this and doubt whether the student, whose heart is so set upon the acquisition of a degree that he will therefore renounce the engineering profession, would in any case have proved himself a satisfactory engineer.

Our colleague Rai Bahadur Lala Ganga Ram dissents from the opinion of the majority for the reasons given in his separate minute. We regret that, for the reasons recorded above, we are unable to support his proposals.

(*b*). *Subordinates.*—We recommend that the same principles should be followed in the case of subordinates as in that of engineers, selection being made by means of an entrance examination from amongst candidates educationally, morally and physically qualified. The educational qualification necessary should, we consider, be the matriculation, school final or corresponding European school standard. The maximum age limits prescribed for entrance into the subordinate classes at Roorkee and Madras appear to us to be unnecessarily high; the minimum age at matriculation is 15 at both the Punjab and Madras Universities, yet the maximum age limits for entrance to the engineering colleges are 21 and 22 at Roorkee (for lower and upper subordinates respectively) and 19 at Madras. We recommend that the maximum age limit at entry to the subordinate classes should be 18 last birthday in all cases. We contemplate that students will ordinarily compete at the entrance examination at the end of the matriculation or school final course but this age limit will allow the exceptional student who desires to do so to spend two years at the university and sit for the intermediate examination.

Length of course.

78. (*a*). *Engineers.*—The committee appointed by the Institution of Civil Engineers in England in 1903 to inquire into the subject of the training of engineers recommended that such training should be divided into three parts, an introductory workshop course of at least one year, a college course of normally three sessions and two or three years' practical training subsequent to this course. These recommendations were endorsed by the whole engineering profession and may be accepted as an authoritative expression of professional opinion. Owing however to the paucity of mechanical workshops in India we believe that it would be impossible to insist on the introductory course in the case of every student entering the colleges and hence we are unable to advocate the adoption of this system in its entirety, but we shall in a later paragraph advise an increased amount of workshop practice during the college course. We recommend that the period of training should extend over five years, of which three should be spent in college and two on works, and that the present year's apprenticeship for students gaining guaranteed appointments in the public works department should be abolished, a period of two years' probation being substituted as recommended by the Public Services Commission, this period of probation being applicable to all recruits, whether appointed in India or in England. The conditions in India are unfavourable to the combination of college instruction and practical training throughout the course, generally known as the sandwich system, and we consider that the practical training on works, which will be referred to in greater detail in the next paragraph, should be taken after the college course, but should be looked upon as an integral part of the students' professional education, and that no diploma or degree should be awarded until it has been satisfactorily performed. Its importance is already recognized by the University of Madras, which withholds the grant of the Bachelor of Engineering degree till after the completion of the year's practical training on works, but both the Calcutta and Bombay Universities award their

Minutes of the Proceedings of the Institution of Civil Engineers, Vol. CLXVI, 1905-06, Part V.

Public Services Commission Report, Annexure XVIII, para. 17.

69(x).

69(xi).

degrees on the result of a theoretical examination only; we advise that these universities should be moved to adopt the system in force in Madras and so essential do we consider this principle, in view of the overwhelming evidence of all classes of witnesses as to the drawbacks of the present system owing to the lack of practical training, that should they refuse to recognize as a qualification for their degrees a course of practical training over which they will have little or no control, a 69(xiii). contingency which certain witnesses have suggested as possible, we recommend that the engineering colleges should sever their connection with the universities and be administered as independent institutions, as is already the case at Roorkee.

(*b*). *Subordinates.*—For the subordinate classes we recommend a period of training extending over four years, three years being spent in college followed by one year on practical works. In this case also the apprenticeship year for subordinates gaining appointments in the public works department should be abolished.

Practical training of engineers.

79. As stated in the foregoing paragraph we place the greatest importance on the practical training of 69(ii). engineering students, an opinion which is endorsed by every professional witness who has given evidence before us. We consider that it is both dangerous to the community at large and derogatory to the engineering profession that students should be permitted to practise as engineers on the strength of having passed a theoretical 62(ii). examination, and we have received evidence that some of them rely almost wholly on the practical experience of the *mistris* employed by their clients. We therefore consider that government should undertake to provide practical training, to the extent already indicated, for every student, whether engineer or subordinate, who passes through the engineering colleges, not only in the public works department but also, if arrangements can be made, in railways, port trusts, district boards, municipalities and private firms. We have no reason to doubt that in this way sufficient facilities for the practical training of all students can be provided and the principal of the college should be responsible for arranging such 69(i). facilities. We do not think it necessary that a separate officer should be employed to supervise the practical training of students, for we doubt whether such supervision would lead to much result, and the college principal should be able to exercise the necessary amount of control. The first portion of this training should be spent on actual works, followed, in the case of engineer students, by a period spent in the drawing office, in order to give them the opportunity of co-ordinating their experience of practical conditions with design. The weight of evidence 69(v). has convinced us that under existing conditions it is not only impracticable to require students to pay a premium for such training, but that many of the apprentices would be unable even to afford to maintain themselves during those years without some assistance from government. We therefore recommend that all students undergoing practical training should receive stipends at the rate of Rs. 50 per mensem for engineers and Rs. 25 per mensem for subordinates. The expenditure involved will be more than recouped by the improved standard of engineering, and when its value has been fully proved the necessity for such stipends can be reconsidered. We

are opposed to the proposal made by several witnesses that government officers undertaking the training of apprentices should receive special fees for this duty, and we are convinced that every officer will be ready to give to such apprentices, without extra remuneration, all the necessary advice and assistance in learning their work.

Practical training of Indian engineers educated in England.

80. The committee appointed by the Secretary of State to inquire into the system of state technical scholarships drew attention to the difficulty experienced by Indian engineering students in England in obtaining opportunities for practical training in that country, and recommended that the Government of India should consider whether facilities could not be given to such students to obtain practical experience in India. We consider it desirable that such facilities should be provided, and recommend that students, who have taken a recognized course of theoretical instruction in England, should be permitted to undergo practical training in India for the same period and on the same terms as those educated in the Indian colleges.

Report of the Committee to inquire into the system of state technical scholarships, para. 69.

Government scholarships.

81. We have been unable to obtain reliable figures of the cost of education of each class of student but it is undoubtedly high compared with the fees, and in addition at all the government colleges and at most of the technical schools, scholarships are awarded by government to a substantial number of students. The amount of each scholarship is usually small; in the case of the engineer classes at the major colleges it varies from Rs. 30 to Rs. 40 per mensem at Roorkee, Rs. 20 to Rs. 40 at Sibpur. Rs. 15 to Rs. 20 at Madras and Rs. 5 to Rs. 12 at Poona. For subordinates it varies from Rs. 4 to Rs. 25 at Roorkee, Rs. 6 to Rs. 12 at Sibpur, Rs. 8 to Rs 10 at Madras and Rs. 4 to Rs. 7 at Poona. The number of such scholarships is, however, large, and at Sibpur the amount thus awarded exceeds the amount of fees by Rs. 21,000 per annum. They are, in the majority of cases, tenable for one year only and are awarded on the result of the previous year's examination. We do not consider that this system is satisfactory; the scholarships are largely treated as prizes and hence are of little assistance to the indigent student who, even if granted a scholarship at the beginning of his course, has no guarantee that he will continue to hold it throughout. We recommend that, instead of these numerous petty scholarships, a smaller number of stipends should be awarded but of an amount which will cover at least the major portion of the student's expenses, and that they should be tenable throughout the course subject to satisfactory progress.

81(i).

Allotment of guaranteed appointments.

82. Under the present system the guaranteed appointments in the public works department are allotted in different ways by the different colleges. At Roorkee two students are posted as apprentices against each vacancy, and if the senior fails to prove his fitness for the post of assistant engineer the junior is appointed. This system has been condemned by the Public Services Commission who have recommended that in future only one apprentice should be posted to each vacancy. At Sibpur the guaranteed appointment is allotted partly on the result of a practical examination held at the end of the period of training on works, at which the six students passing highest in the Bachelor of Engineering examination compete, and partly on the marks obtained in the latter examination. At Madras the student is appointed who is

Public Services Commission Report, Annexure XVIII, para. 17.

48(i).

judged most suitable on the results of the examinations, the promise shown by him, and his general behaviour during the college course, the course being deemed to include the year of practical training. At Poona the appointment is awarded solely on the result of the Bachelor of Engineering examination. We recommend that in future guaranteed appointments in the department should be allotted at the end of the period of training, when a final practical examination should be held, on the lines of that followed at Sibpur. This examination should include tests in levelling and surveying, the practical design and setting out of works, the resources of the country (including the manufacture and use of materials and the analysis of rates), the elements of practical mechanical and electrical engineering, drawing, estimating, handicraft and riding. The proportion of marks to be allotted to this examination should be half of the total of the final theoretical examination. In awarding these appointments the reports received from the officers under whom the students have received their practical training should also be taken into consideration, and a satisfactory report should be an essential qualification for appointment.

Qualifications implied by engineering degree.

40(ii). 83. Some witnesses have stated that students occasionally enter the engineering colleges without any intention of joining the profession but with the sole object of obtaining a degree and thus entering some other branch of government service as a graduate, and it has been suggested that the degree in engineering should not be considered as a qualification for entrance to government departments other than the public works. We agree with this suggestion; the education of an engineer is expensive to government and accommodation at the colleges is limited, and it is undesirable that the colleges should be utilized as a means of securing appointments in departments where technical qualifications are not required. We therefore recommend that a degree in engineering should not in itself be regarded as a qualification for entry into government departments other than the public works, although the possession of an engineering degree should not disqualify the holder for posts for which he is otherwise qualified.

Suitability of college curricula.

41(ii). 84. The evidence received by us has in general tended
to show that the standard of the theoretical education
imparted at the government colleges is sufficiently high,
41(iii). and that in the case of the subordinate classes it is possibly
even higher than is necessitated by the work which the
students are eventually required to perform. Opinion
41(v). is however almost unanimous that both graduates and
subordinates, on first taking up outside work, show lack
of practical ability and it is with the intention of remedying
this defect that we have advocated a compulsory training on actual works. The Committee appointed by the Secretary of State to inquire into the system of state technical scholarships laid stress on the advisability of giving all Indian engineering students a preliminary workshop training before the college course, but as already stated we consider that, in the present conditions of India, this is impossible; we recommend however that provision should be made in the curricula of the various colleges for an increased amount of workshop practice particularly during the first two years of the course, so as to remedy the want of the preliminary training as far as possible. We also recommend that a more

Report of the Committee to inquire into the system of state technical scholarships, para. 66 (i).

prominent place should be given to mechanical engineering 41(i). in the civil engineer's course, and that students should be instructed, as far as it can be arranged, in the care, hand- 41(iv). ling and repair of such machines as portable engines, steam rollers, etc., with which they are likely to have to deal in their every day work.

Specialization at colleges.

85. Several witnesses have recommended that further 85(i). specialization should be permitted during the college course, and that students should be encouraged to take up special branches of civil engineering such as irrigation, railway or sanitary engineering and devote themselves particularly to the branch selected. We are opposed to such specialization during the college course of three years, which will include elementary instruction in these subjects, and which is not too long a period to devote to the production of an all-round civil engineer. If any student desires to specialize in a particular branch 85(iii). he should be allowed to do so only after the completion of his general training. With the growth of a real demand for such specialization post-graduate courses might be introduced at the various colleges, one college providing for sanitary engineering, another for irrigation and so forth, and these courses might become extremely valuable if men could be persuaded to attend them after first putting in a year or two of practical work in the subject concerned. We consider however that some provision should be made for the separate training of architects. It is desirable that every civil engineer should have an elementary training in architecture, and with this object in view we recommend that, where it is not already the case, the elements of the subject should be added to the curricula of the engineering colleges. For the training of architects proper, as distinct from engineers, we recommend the institution of a separate college, and we endorse the proposal of the Bombay 82(i). Government to start such a school in connection with the present school of art, the courses to include such subjects as stresses and strains, quantity surveying, hygiene and electrical engineering, leading up to the award of a degree in architecture. We are convinced of the necessity for one good school of architecture in India, and Bombay is the most suitable centre and will probably meet all requirements for the time being. Provision should also be made, at places where a demand for such men exists, for the training of architectural draughtsmen in the various technical institutes and schools of art. We attach as Appendix C a memorandum kindly furnished to us by the Royal Institute of British Architects on Indian building, which may be read in connection with this paragraph.

Limitations on number of engineering students admitted to the colleges.

86. The numbers of admissions to the engineering classes of the colleges are limited ordinarily to 20 at Roorkee, 40 at Sibpur, 20 at Madras and 50 at Poona, although we were informed that owing to lack of accommodation only 24 are usually admitted to Sibpur, while in practice as many as 30 are admitted at Madras, and it has been suggested by some witnesses that these 39(vi). numbers should be increased. We are not convinced, however, that the annual output of engineers is less than the existing demand, and this view receives support from the fact that 46 per cent. of the upper subordinate posts in Bengal are filled by Bachelors of Engineering, that 60 per cent. of the products of the engineering class at Madras accept subordinate positions, and that posts as upper

subordinates are guaranteed to and accepted by the students from Poona passing second and third in the Bachelor of Engineering examination. It is obviously uneconomical for government to provide, at considerable expense, an engineering education of the highest standard for a man who will remain for the greater portion of his life in an inferior position and will never have the opportunity of exercising the knowledge gained during his college course. If however our recommendations in regard to the formation of a provincial service are accepted and district boards are encouraged to employ qualified engineers it may prove necessary to enlarge the engineering classes of some of the colleges, particularly of Roorkee.

Equipment of colleges.

87. We consider that the four major engineering colleges are generally equipped with better apparatus than is necessary for the purposes for which they are intended. The essential requirements for a college are simple machines of a suitable type and in sufficient number for the students to handle, rather than more elaborate apparatus. There seems to be a tendency on the part of the staff of some of these colleges to apply for more elaborate equipment than is actually required for instructional purposes, and in this connection we would particularly mention the equipment proposed for the new engineering college at Madras, which appears to us to be unnecessarily elaborate. The apparatus installed is often more suitable for post-graduate research and elaborate test experiments than for instructional purposes, but it should be remembered that the primary function of the college is to train engineers, and care is required that such research and testing are not allowed to interfere with the ordinary college course. For this reason we are averse to any further research work being undertaken by the professorial staffs, unless it is proved not to interfere with educational requirements, and we recommend that, in future, no fees should be charged for tests undertaken in the colleges.

Recruitment of staff.

88. The question of the sources from which the professorial staff should be recruited is one upon which we received a considerable amount of evidence and several witnesses have suggested that it would be advantageous to recruit a larger proportion of the professors of engineering from officers of the public works department with practical experience of engineering in India. We consider that such teaching appointments would not be likely to attract suitable officers, as the best engineers would probably be unwilling to abandon their practical work for professorial posts and that, even if good engineers were attracted, they would not necessarily make good teachers. In general the existing staffs appear to us to be satisfactory, and we recommend a continuance of the present system of direct recruitment; we would however make an exception in regard to the post of principal, leaving it to the local Government concerned to fill vacancies by the appointment of an engineer or of an educational officer, as may be most suitable. Subordinate posts in the college may be filled, as at present, by a proportion of subordinates of the public works department, but great care should be exercised in selecting them. It would also, in our opinion, be advantageous to arrange for senior officers of the department or distinguished private engineers to give from time to time courses or single lectures based on their

39(vii).

experience of practical work. In time it may also be desirable to create honorary chairs to be filled by distinguished members of the profession, who would give a course of lectures on the lines followed at medical colleges.

Special questions relating to Roorkee college.

89. (*a*). *Control.*—The Roorkee college is at present
controlled by the branch of the secretariat dealing with
industrial matters, with the assistance of a committee
of management of which the chief engineer and the
director of public instruction are members. We do
not consider that this arrangement is altogether suitable;
it appears to have been introduced owing to the inclusion
of textile and industrial classes, but we have already
advocated that all such subordinate instruction should,
where practicable, be relegated to technical schools.
The functions of the college are educational rather than
industrial, and hence we recommend that, as in other
provinces, it should be administered through the educa- 78(vi).
tion department of the local Government, assisted by
a board of visitors upon which the public works depart-
ment should be represented. We also consider it advis- 78(iv).
able that the present informal board of studies, con-
sisting of the college professorial staff, should be officially
recognized and its functions defined.

(*b*). *Affiliation to the University.*—Certain members 78(i).
of the professorial staff of the college have urged that
affiliation to the Allahabad University would be greatly
to the advantage of both the college and the staff, as
thereby the college would be established in its proper
place in the educational system of the province and the
professors brought into touch with other educational
work. We consider, however, that Roorkee is so isolated
by its geographical position that its association with
Allahabad would in any circumstances be of little benefit,
and that affiliation presents more disadvantages than
advantages. It would, in the first place, be very difficult
to form a satisfactory faculty owing to the paucity of
private engineers in northern India, (such a faculty was
formed in 1893 but died of inanition ten years later) 78(iii).
and the admission to the syndicate of a representative
of the faculty with little interest in general educational
questions would be detrimental to the university. There
would be a real danger of the formation of a faculty
overburdened with representatives of pure science
subjects, whose inclination would be to set a higher
standard in those subjects than is necessary for an
engineer, a difficulty that has already been experienced
in some of the engineering colleges already affiliated.
It has also been brought to our notice that affiliation 99(i).
results in considerable delays in introducing desirable
changes in the courses of instruction. Yet another danger
is the possibility of the affiliation in future of institutions
with totally different ideals to those of Roorkee and
which might yet obtain a preponderating voice in deter-
mining courses which would apply to the latter college.
It has been urged that a degree in engineering would 100(i).
attract better students than at present, but we find that
Roorkee already attracts a better class of student than
any of the colleges which are so affiliated, and as already
stated, the student who joins a college not with the desire
to practise the profession of engineering but merely as a
stepping stone to a degree is not the type required.
Further, unlike the presidency colleges, Roorkee is not
a territorial institution but draws candidates from and

provides engineers for the United Provinces, Punjab, Burma, Bihar and Orissa, Central Provinces and Assam, and there seems no reason for affiliating it to the Allahabad rather than to the Punjab University. This point will be further intensified if universities are instituted, as proposed, at Rangoon, Patna and Nagpur. For all these reasons we recommend that the Roorkee college should not be affiliated to any university. A possible alternative would be to empower the Roorkee college to grant its own degree instead of a diploma, which would have some advantages, but we have not been able to examine the important educational issues involved in this suggestion.

78(v). (*c*). *Curriculum.*—It has been suggested by certain members of the college staff that the curriculum at Roorkee would be improved by the reduction of the courses in estimating and surveying, which subjects are said to possess little real educative value. As we have 42(i). already stated, evidence has been given by some engineering witnesses that the standard of estimating in India is lower than in Europe, and it has been suggested 74(i). that trained quantity surveyors should be imported. We, therefore, deprecate any reduction of the standard of instruction in estimating. Surveying is universally considered a subject of great importance in the training of an engineer, in which it is difficult to acquire correct methods after leaving college. The present course in this subject appears satisfactory and we recommend that no change should be made. It has also been suggested that the preparation of the engineering project, which all students of the civil engineer class are required to undertake at the end of their third year's course, occupies an undue amount of time to the detriment of their general engineering education. The object of this project is to give the students an opportunity of putting into practice the principles learnt during the course, but we doubt whether, until they have some knowledge at least of the practical side of engineering, it is of much use to demand from them a complete project for a canal or railway. To the intelligent preparation of such a project a knowledge of the actual conditions under which works are executed is essential and with the introduction of the system of practical training which we have advocated we consider that the project will no longer be necessary as a portion of the college course, and that it can suitably be discontinued.

Government technical schools.

90. In addition to the four major engineering colleges, there are also five government technical schools for the training of subordinates, at Dacca in Bengal, Patna in Bihar, Insein in Burma, Nagpur in the Central Provinces and Rasul in the Punjab. Of these the first four mentioned have classes for both overseers and sub-overseers, the school at Rasul training lower subordinates only. We recommend that our general proposals in regard to the training of subordinates, contained in paragraphs 77 and 78 above, should be made applicable to these schools. There should be only one subordinate class, educating boys up to the same standard as those of the major colleges, selection of students for admission being made by means of a competitive entrance examination from amongst candidates educationally, morally and physically qualified, the matriculation, school final or corresponding European school standard being accepted

as the necessary educational qualification. The age at entrance should not exceed 18 last birthday, and the period of training should extend over four years, three years being spent in college, and one on practical work, government being responsible for providing facilities for the latter and no certificate being given until it has been satisfactorily performed. During the year spent on works students should receive stipends of Rs. 25 per mensem, as proposed for subordinates from the major colleges. Our recommendations in regard to government scholarships, contained in paragraph 81, apply equally to these technical schools.

We have already, in paragraphs 35 and 66, recommended that increased facilities should be provided in the technical schools for the training of *mistris* and foremen. The provision of such training should, we consider, be regarded as an important function of these institutions, classes being started with this object in view where they do not exist.

During our tour we visited the schools at Patna, Insein and Nagpur. The school at Patna is provided with suitable accommodation and equipment to meet present requirements, but we consider that the workshop 94(v). staff is inadequate and that it is impossible for a single foreman to undertake the training of 200 boys; we recommend therefore that it should be strengthened. At the Nagpur school we advocate the addition of further workshop practice to the curriculum. The school at Insein in Burma is much below the standard of other schools; the accommodation in the class rooms and 94(ii). hostel is inadequate, the mechanical workshops are badly designed and not nearly large enough, and the equipment is poor. The headmaster has succeeded in the last few years in attracting a superior type of student to the school and, as more boys apply for admission, the class of entrant will doubtless continue to improve. We attach great importance to the Insein school, which is the only institution of its kind in Burma, as tending to encourage industrial enterprise among the Burmans, and we recommend that its condition should receive a thorough investigation at the hands of the local Government and that it should be so improved, enlarged and equipped (and some portions, including the mechanical workshops, entirely rebuilt) as to fit it properly for the work which it is designed to perform. As the Burman has only lately begun to adopt engineering as a profession, we consider that everything possible should be done to attract him to it, and in the case of Insein we agree that the rigid age limit which we have recommended 94(iii). for entrance to the subordinate classes elsewhere might be relaxed, students of more advanced age being permitted to enter, provided that accommodation is available and that they are not allowed to compete with other candidates for government service.

F. G. SLY,
President.

N. T. KERSHAW,
C. S. COBB,
* GANGA RAM,
A. T. MACKENZIE,
Members.

D. G. HARRIS,
Secretary.

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* Signature subject to the remarks contained in the minute appended.

MINUTES RELATING TO THE REPORT BY MEMBERS SIGNING THE REPORT.

Minute by Rai Bahadur Lala Ganga Ram.

I have signed the report as I am in full agreement with my colleagues as to the suitability of the main lines of advance indicated therein. There are, however, two points of importance in regard to which I do not concur in the recommendations of the majority, and, being apprehensive lest the acceptance of these recommendations in all their details may be detrimental to the success of our main scheme of reorganization, I append this minute to explain the grounds upon which my apprehensions are based and to indicate more clearly than has been done in the report the objections to which, in my opinion, the majority proposals are open.

Paragraph 17: Organization of engineering staff after transfer of public works to district boards.

2. In this paragraph are detailed the terms upon which it is proposed that engineers shall be employed by the district boards. The essential feature of this scheme is that such engineers shall be, in all respects, the servants of the board employing them. They will be subject to no superior technical control in regard to the details of the execution of works, it being specifically laid down in sub-paragraph (*b*) that the proposed inspector of works will exercise no direct authority over the district boards or over their engineering staff, his duty being merely to call the attention of the boards, through the medium of inspection reports, to such instances of negligence or inferior work as may come to his notice, and to report to the commissioner any case of a district engineer whom he considers unfit for his appointment. While agreeing with my colleagues as to the main principle that in future the administration of all public works, whether imperial, provincial or local, should as far as possible be entrusted to local bodies, I believe (and this belief is based on a practical experience of local boards and municipalities extending over 20 years, during which I served as an *ex officio* member of all such as fell, from time to time, within the limits of my charge) that to give to such bodies full powers of control over their technical staff and over the actual details of the execution of work will endanger the success of the whole scheme and subject it to a risk of failure such as attended the same experiment in the United Provinces in 1882 and in Bengal ten years later.

3. In the first place, so long as district boards are constituted as at present, the system advocated will tend, in my opinion, to lower the status of the district engineer, particularly in the less advanced provinces, and to deter the best class of man from competing for such posts.
939 Considerable stress was laid on this aspect of the case by
949 certain witnesses in the Central Provinces, which may per-
1123(6) (ii) haps claim to be the most advanced of all in the matter of
and note local self-government, inasmuch as every district board in
1183 that province has a non-official chairman. It was stated
1195(3) in evidence that the members of the local bodies did not
1321 occupy a sufficiently strong social position to permit of
1335 their dealing directly on terms of personal authority with

NOTE.—The figures in the margin refer to the paragraphs in Volume II of the Minutes of Evidence.

qualified engineering officers, that they were not in a position to decide upon matters of professional detail and that any attempt to relegate the engineer to the position of a servant of the local board could only lead to friction and failure. This opinion was shared by the Hon'ble Mr. 1144. (now Sir James) Walker, Commissioner of the Nerbudda Division, who advocated that, although the remainder of the district staff might be placed under the control of a board of works with the deputy commissioner as chairman, the district engineers should, for the present, be excluded from that control and formed into a service for the whole province. I am convinced that the subordination of the engineer to the district boards in their present state of development would deter large numbers of suitable candidates from adopting engineering as a profession.

4. The absence of superior executive technical control is also, to my mind, a weak point in the scheme. As already stated the proposed inspectors of works are to exercise no authority over the district engineers, and in the case of a large government work, such as might conceivably be required even in a third class district, the whole details of its execution will be in the hands of an officer drawing Rs. 300 a month, possibly a newly joined recruit from the engineering college. The inspector will be debarred from giving him direct orders and, if his advice is not followed, the most he will be able to do will be to report him to the works sub-committee of the board, which will presumably meet only at intervals, and by that time the mischief will have been done and the money wasted. In the interests both of efficiency and economy I consider that the inspector should possess powers of direct executive control over the district engineers within his division analogous to those exercised by the superintending engineer over the executive engineers within his circle under the present system. He should also be an *ex officio* member of all district boards within his jurisdiction, and vice-chairman of their works sub-committees, presiding over their meetings in the absence of the deputy commissioner.

5. There are in my opinion other defects inherent in the scheme, upon which I will only touch in passing, such as the inevitable canvassing for the votes upon which every issue, from the appointment of an engineer to the giving of a contract, will depend, and the difficulties which will arise owing to communal and religious differences especially in the northern provinces. I apprehend also that the withdrawal from the engineering colleges of the guaranteed appointments at present allotted to them in the buildings and roads branch of the department will lead to deterioration in the class of candidate entering those institutions. The evidence taken by the Committee left no doubt but that these appointments formed the principal attraction of the colleges and, without going into the question of whether this is or is not as it should be, I have no hesitation in stating that, in Indian eyes, the creation of a number of temporary appointments under district boards, even with the prospects now proposed, will not be looked upon as compensating for the withdrawal of the government posts.

6. The main objects which the Secretary of State and the Government of India had in view when appointing this Committee were apparently the introduction of a more economical system of working than that at present in

force, the abolition of the existing duplication of staff, the establishment of closer relations between the engineer and the civil authorities, and the development, as a result, of private enterprise and local autonomy. I consider that all these objects could be more suitably and economically obtained by less drastic means than those proposed by my colleagues. They have, I think, underrated the difficulties which will arise during the protracted transition stage which they contemplate. They suggest, in paragraph 23, three alternatives for the disposal of the existing staff, namely transfer to local bodies, transfer to other provinces or to the irrigation branch, or failing these, premature retirement. In regard to the first if the appointment of engineers is left to the district boards they will probably in most cases prefer to select their own nominee rather than to take an official of the public works department, nor do I consider it likely that any government engineer will accept service with a local body on the terms proposed. The feasibility of the second alternative must depend upon the development of irrigation work, a somewhat doubtful factor in view of the present restriction of funds which may be expected to continue for some time after the war ; there are also difficulties in the way of the transfer of senior officers from buildings and roads to irrigation divisions if they have had no previous experience of irrigation and revenue work. I agree with my colleagues that the adoption of the third alternative except in isolated cases is highly undesirable. Were it known abroad that government was about to retire prematurely, purely for the purpose of the proposed reorganization, any considerable proportion of the permanent staff of a great department it would undoubtedly have a most injurious effect on recruitment in India to the sister branches of irrigation and railways and would probably kill recruitment in England altogether, not only for these branches but for other services also. In my opinion any system of reorganization, to be suitable for its purpose, should be capable of introduction without jeopardizing the interests of the existing staff.

7. For all these reasons it appears to me that the majority recommendations, if accepted, will entail an excessive sacrifice being made at the altar of local self-government and, without desiring in any way to belittle the importance of the latter aspect of the case, I am of opinion that the experiment, involving as it does the summary abolition of a great department and the transfer of works costing nearly Rs. 6½ crores per annum to a more or less untried agency, is both too drastic and too expensive a one to be justifiable on this ground alone.

8. I now proceed to formulate an alternative scheme which, in my opinion, would attain the principal objects aimed at but be free from the objections set forth above. The organization which I advocate would provide for an engineer in every district and an inspector of works in each commissioner's division, and would entail the maintenance of two separate services, an imperial or superior service, from the ranks of which the inspectors would be drawn, and a provincial or second service, on the lines of the provincial civil service, which would furnish the majority of the district engineers. The chief engineer, his personal assistant and the inspectors of works would be members of the imperial service, the strength of which would be so regulated that a sufficient number of officers

of over 15 years' service would always be available to fill these posts. The officers of this service of less than 15 years' standing would be regarded as in training for inspectorships, and would be employed, some in charge of special works directly under the inspectors and some in ordinary district charges. They would thus obtain a thorough knowledge of executive matters before the time for their promotion arrived, and the provision of this training reserve would obviate the necessity for the employment of temporary staff upon the works carried out under the direct supervision of the inspectors, which, although advocated in paragraph 17(*c*) of the report, has in the past invariably proved to be an unsatisfactory arrangement. Officers should be recruited to this service at about the same age as at present, 40 per cent. of the appointments being guaranteed to the Indian engineering colleges, 40 per cent. being reserved for Royal Engineer officers and for engineers appointed by the Secretary of State in England, and 20 per cent. being filled by the promotion of provincial service engineers. The provincial service in its entirety should be recruited from the Indian colleges; its organization should be largely on the lines detailed in paragraph 34 of the report with the special provident fund described in paragraph 54 in lieu of the existing pension arrangements. There should be no promotion from the subordinate to the provincial service, such promotion tending, in my opinion, to affect adversely the status of the engineer. There are, however, particularly in the more backward provinces, a certain number of districts in which, even if government and local works were combined under one agency, the resulting quantity would be insufficient to justify the appointment of a district engineer on Rs. 300—400 and such districts might suitably be reserved for members of the subordinate service, who should receive a pay of Rs. 150—250 a month while so employed.

9. This scheme appears to me to possess considerable advantages over that recommended by the majority. While leaving the administrative and financial control of public works in the hands of the local bodies, and bringing the organization of the engineering department into a close relationship with that of the district and division, it obviates all the difficulties to which I have referred as inherent in the majority proposals. Its introduction would be a comparatively simple matter; indeed, were the department first reorganized as contemplated in Chapter V of the report, the whole framework of the system would be ready to hand and it would need only a redistribution of charges and a slight change in the methods of recruitment to introduce it in its entirety. If the majority proposals are to be accepted, however, it seems questionable whether it is worth while to undertake so elaborate a reorganization of a department which lies under sentence of abolition.

Paragraph 77. Age limit and educational qualifications to be prescribed for admission to the engineering colleges.

10. The second point upon which I differ from my colleagues is in regard to the age of admission to the engineering colleges. The age advocated by the majority is 19 last birthday, with the intermediate standard as the compulsory educational qualification. I consider that these

proposals are open to two objections. In the first place the intermediate standard is no definite educational landmark ; it is merely a stage on the road to the degree and it seems to me undesirable to require a student to break off in the middle from the course of study upon which he has embarked, and to utilize the preliminary portion of that course for a purpose entirely different from that for which it was designed. I would also emphasize the argument adduced in paragraph 77 (*a*) of the report, that the Indian student has the disadvantage of having to prosecute his studies in a foreign language and that if he is to hold his own both in college and in after-life with his English confrères, he must have a thorough grounding in the language at the start, a grounding which, in my opinion, is not connoted by the intermediate standard. While acquiring this grounding he would also have the opportunity of studying higher mathematics and science, a knowledge of which can be as readily obtained in an arts or science as in an engineering college, thereby allowing of more time being allotted in the latter to practical subjects.

For these reasons I should be inclined to recommend that the age of admission should be fixed at 21 last birthday with the Bachelor of Arts or Science degree as qualification but, in deference to the views of my colleagues, I am willing to agree to an age limit of 20 last birthday so as not to debar a brilliant student from obtaining his degree before entrance, which he would be able to do if he failed in none of the intermediate stages. I recognize, however, that this proposal does not meet the main argument upon which the majority recommendation is based, namely that students should be brought into the atmosphere of their future profession at as early an age as possible. I am personally convinced that the reduction of one year in the age of admission will make little difference, and that the advantages to be obtained by the adoption of the higher limit will more than outweigh other considerations. If, however, so early an initiation is to be insisted upon, and 19 last birthday is to be fixed, it appears to me unnecessary to require the student to waste two years in passing the intermediate examination. In that case I would recommend that the matriculation or school-leaving standard should be fixed as the minimum educational qualification and, in order to give facilities for preparation and to enable the students to obtain a good grounding in mathematics, science and English, the educational authorities should be moved to allow such boys to attend college classes in these subjects as casual students.

11. There is, moreover, the probability that special training institutions will spring up for the purpose of preparing boys for admission to the engineering colleges. My colleagues have laid considerable stress on the dangers of cramming but I consider that these have been somewhat exaggerated ; several of the principal European schools have special classes for training boys for the engineering colleges (those at the La Martinière College, Lucknow, and at the old Mussoorie School have provided no less than two-thirds of the total number of Europeans who have passed through the engineer class at Roorkee) and the evils of cramming have not been apparent in connection with them. There will be time for a three years' course after matriculation, and such a course could

be adapted to meet the special needs of the students. If, as I believe would be the case, suitable institutions sprang into being, the result would be the attainment of the object which as already stated my colleagues declare to be their real desire, namely to bring the student, at the school-leaving stage, into the atmosphere of his future profession.

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STATEMENT I.

Expenditure incurred on works executed under the direct executive supervision of the public works department in India.

Province.	GOVERNMENT WORKS.														
	45.—CIVIL WORKS—IMPERIAL.						45.—CIVIL WORKS—PROVINCIAL.						Military works.	Other works executed by public works department, *e.g.*, Famine relief but excluding Irrigation.	Total government works.
	Buildings.		*Communications.*		Other works (Miscellaneous public improvements).	Total	*Buildings.*		*Communications.*		Other works (Miscellaneous public improvements).	Total			
	Original works.	Repairs.	Original works.	Repairs.			Original works.	Repairs.	Original works.	Repairs.					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Madras	1,69,041	55,115	..	..	..	2,24,156	36,19,342	5,59,091	2,88,660	2,39,203	5,94,737	53,01,033	54,902	2,56,802	58,36,893
Bombay	4,38,488	1,64,701	..	..	22,438	6,25,627	34,26,047	7,17,280	8,27,230	12,16,672	11,09,742	72,96,971	64,544	83,905	80,71,047
Bengal	11,52,396	2,01,465	6,105	45,553	..	14,05,519	32,99,845	8,24,378	1,92,569	7,59,104	1,52,269	52,28,165	30,460	..	66,64,144
United Provinces	3,30,627	1,00,622	..	..	..	4,31,249	22,65,579	4,87,579	4,85,889	15,80,990	3,28,515	51,48,552	11,977	1,53,782	57,45,560
Punjab	3,20,719	77,421	748	..	237	3,99,125	24,39,605	3,61,530	5,68,625	11,34,237	2,74,701	47,78,698	1,01,528	..	52,79,351
Burma	2,11,643	64,612	..	..	..	2,76,255	18,50,208	7,81,790	9,56,026	23,23,596	5,73,499	64,85,119	3,77,471	..	71,38,845
Bihar and Orissa	1,03,055	40,043	..	..	..	1,43,098	33,09,623	2,93,378	4,77,691	3,91,230	49,359	45,21,281	14,683	..	46,79,062
Central Provinces	1,52,306	20,296	..	..	..	1,72,602	20,16,423	2,68,800	10,67,521	15,91,128	1,38,880	50,82,752	2,598	...	52,57,952
Assam	27,563	14,319	..	..	..	41,882	6,55,361	1,80,980	14,70,467	9,69,626	1,35,629	34,12,063	40,181	..	34,94,126
TOTAL	29,05,838	7,38,594	6,853	45,553	22,675	37,19,513	2,28,82,033	44,74,806	63,34,678	1,02,05,786	33,57,331	4,72,54,634	6,98,344	4,94,489	5,21,66,980

STATEMENT I—(*concld.*)

Expenditure incurred on works executed under the direct executive supervision of the public works department in India—(concld.)

Province.	LOCAL BOARD WORKS.								DEPARTMENTAL CHARGES.							
	WORKS EXECUTED BY THE PUBLIC WORKS DEPARTMENT ON BEHALF OF LOCAL BOARDS (EXCLUDING MUNICIPALITIES).								TOTAL COST OF PUBLIC WORKS DEPARTMENT ESTABLISHMENT.							
	Buildings.		*Communications.*													
	Original works.	Repairs.	Original works.	Repairs.	Other works (Miscellaneous public improvements).	Total.	Contribution works.	Grand total works.	Direction.	Construction.	Total.	Tools and plant.	Suspense.	Grand total expenditure.	Percentage "establishment" to "works."	Percentage "direction" to "works."
—	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
Madras	366	..	8,729	31,000	10,793	50,888	5,26,677	64,14,458*	2,19,536	11,31,249	13,50,785	1,45,091	43,687	79,54,021	21·05	3·42
Bombay	2,41,291	7,147	5,92,866	7,86,411	30,994	16,58,709	13,13,807	1,10,43,563	3,47,630	13,02,825	16,50,455	2,45,286	49,939	1,29,89,243	14·95	3·14
Bengal	..	..	..	..	2,00,995	2,00,995	7,706	68,72,845	3,19,721	8,25,203	11,44,924	77,205	—14,616	80,80,358	16·65	4·65
United Provinces	4,71,028	88,127	6,81,245	11,94,029	13,118	24,47,547	11,11,748	93,04,855	3,51,910	11,12,660	14,64,570	76,814	—1,32,444	1,07,13,795	15·73	3·78
Punjab	15,778	168	8,694	1,935	338	26,913	10,06,750	63,13,014	2,99,848	6,54,010	9,53,858	70,624	—55,465	72,82,031	15·11	4·74
Burma	74,309	13,559	3,83,586	5,26,089	4,51,020	14,48,563	10,03,541	95,90,949	5,68,469	17,05,801	22,74,270	2,01,427	—13,520	1,20,53,126	23·71	5·92
Bihar and Orissa	..	..	..	..	..	..	29,726	47,08,788†	2,38,226	5,11,013	7,49,239	1,61,798	95,389	57,15,214	15·91	5·05
Central Provinces	6,290	..	34,327	14,490	210	55,317	5,65,449	58,78,718	2,65,362	7,40,482	10,05,844	1,60,556	—15,506	70,29,612	17·11	4·51
Assam	9,017	54	2,33,170	14,464	1,06,487	3,63,192	10,312	38,67,630	1,89,731	4,91,552	6,81,283	63,567	—7,913	46,04,567	17·62	4·90
Total	8,18,079	1,09,055	19,42,617	25,68,418	8,13,955	62,52,124	55,75,716	6,39,94,820	28,00,433	84,74,795	1,12,75,228	12,02,368	—50,449	7,64,21,967	17·62	4·38

* Includes Rs. 1,34,655 on works executed by civil officers acting as public works disbursers.

† Average for the two years 1912-13 and 1913-14.

STATEMENT II.

Expenditure incurred on works executed under the direct executive supervision of district board establishment in India.

Province.	LOCAL WORKS.									GOVERNMENT WORKS.						Grand total works.	OTHER CHARGES.			Grand total expenditure.	Percentage "establishment" to "works."	Number of districts.
	45.—CIVIL WORKS—WORKS IN CHARGE OF DISTRICT AND LOCAL BOARDS.						Works executed on behalf of municipalities by local fund establishment.	All other contribution works executed by local fund establishment.	Other works executed by local fund establishment, *e.g.*, Famine relief but excluding Irrigation.	45.—CIVIL WORKS—WORKS EXECUTED BY DISTRICT AND LOCAL BOARDS ON BEHALF OF GOVERNMENT.							Total cost of local fund engineering establishment.	Tools and plant.	Suspense.			
	Buildings.		*Communications.*		Other works.	Repairs.				*Buildings.*		*Communications.*		Other works.	Repairs.							
	Original works.	Repairs.	Original works.	Repairs.						Original works.	Repairs.	Original works.	Repairs.									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
Madras	5,24,660	1,79,579	16,82,425	44,82,121	5,79,188	4,28,463	..	..	..	..	..	..	..	..	..	78,76,436	9,43,972	1,02,968	..	89,23,376	11·98	25
Bombay	82,778	1,18,607	2,79,309	6,67,352	3,83,576	..	..	9,927	5,944	13,538	15,149	..	1,061	5,605	..	15,82,906	1,83,800	23,336	..	17,90,042	11·61	25
Bengal	92,234	25,023	10,73,239	8,42,730	2,85,110	51,332	..	..	..	20,859	12,862	33,299	1,87,902	..	..	36,24,590	4,81,290	41,048	..	41,46,928	13·28	25
United Provinces	3,03,243	1,53,380	80,156	3,08,335	7,227	3,431	..	2,562	..	..	..	..	..	..	..	8,58,334	85,280	1,904	..	9,45,518	9·94	48
Punjab	6,02,963	1,82,415	2,50,797	,07,468	68,800	34,947	1,01,514	6,984	..	4,241	18,810	..	33,074	661	3,754	22,16,328	2,36,230	19,495	1,132	24,73,185	10·66	28
Burma	17,502	7,942	38,122	24,803	49,808	25,194	..	..	..	..	..	..	..	..	..	1,63,371	59,810	700	..	2,23,881	36·61	36
Bihar and Orissa	1,04,779	34,234	11,89,614	14,16,498	96,390	35,023	25,671	1,41,735	..	33,831	3,537	24,361	23,679	..	..	31,29,352	5,06,783	53,589	..	36,89,724*	16·19	20
Central Provinces	3,36,493	1,09,049	1,07,008	1,82,963	65,738	35,225	10,115	6,336	..	1,875	456	2,904	12,972	167	..	8,71,301	1,25,463	10,807	5,049	10,12,620	14·40	22
Assam	3,488	5,353	3,06,859	3,96,265	1,23,610	26,013	..	..	..	..	..	..	..	..	..	8,61,588	59,870	9,018	15,776	9,46,252	6·95	19
Total	20,68,040	8,15,642	50,07,529	1,02,28,535	16,59,447	6,39,628	1,37,300	1,67,544	5,944	74,344	50,814	60,564	2,58,688	6,433	3,754	2,11,84,206	26,82,498	2,02,865	21,957	2,41,51,526	12·66	248

* Average for the two years 1912-13 and 1913-14.

Statement III.

Comparative cost of public works department establishment and the establishment required after transfer of government works to district boards, in the United Provinces.

Cost of existing Public Works Department establishment.				Cost of Public Works Department establishment reorganized according to the recommendations of the Public Services Commission.				Cost of Public Works Department establishment reorganized according to the recommendations contained in paragraph 34 of our report.				Cost after transfer of Government works to district boards.			
No.	Name of appointment.	Pay	Cost per mensem.	No.	Name of appointment.	Pay.	Cost per mensem.	No.	Name of appointment.	Pay.	Cost per mensem.	No.	Name of appointment.	Pay.	Cost per mensem.
		Rs.	Rs.			Rs.	Rs.			Rs.	Rs.			Rs.	Rs.
1	Chief engineer . . .	2,500-2,750	2,625	1	Chief engineer . . .	2,500-50-2,750	2,625	1	Chief engineer . . .	2,500-50-2,750	2,625	1	Chief engineer . .	2,500-50-2,750	2,625
1	Superintending engineer, 1st class (provincial).	1,600	1,600	4	Superintending engineers .	1,500-100-2,000	7,333	4	Superintending engineers .	1,500-100-2,000	7,333	12	Inspectors of works . .	1,250-50-1,750	18,667
2	Superintending engineers, 2nd class (imperial).	1,750	3,500									7	District engineers, 1st class	800-40-1,000	6,533
1	Superintending engineer, 3rd class (imperial).	1,500	1,500									11	District engineers, 2nd class	500-40-700	6,967
15	Executive engineers (imperial)	800-50-1,250	16,500	11	Executive engineers (imperial).	700-50-1,250	12,500	8	Executive engineers (imperial).	700-50-1,250	8,350	30	District engineers, 3rd class	300-20-400	11,000
7	Executive engineers (provincial).	535-35-850	5,215	10	Executive engineers (provincial).	500-50-1,050	8,500	9	Executive engineers (provincial).	500-50-1,050	7,500	[5]	Acting allowances to officers officiating as district engineers.	160, 100, 60, 60, 60	440
13	Assistant engineers (imperial).	380-40-700-50-750	7,110	7	Assistant engineers (imperial).	380-40-660	3,580	6	Assistant engineers (imperial).	380-40-660	3,160				
5	Assistant engineers (provincial).	250-25-475	1,825	6	Assistant engineers (provincial).	300-37½-450	2,300	5	Assistant engineers (provincial).	300-37½-450	1,900				
12	Sub-engineers . . .	300-375-450	4,275	12	Sub-engineers . . .	300-375-450	4,275	5	Provincial service officers .	600-20-700	3,333				
20	Supervisors . . .	175-225	3,900	20	Supervisors . . .	175-225	3,900	45	Provincial service officers .	250-15-550	18,000				
3	Overseers	120	360	8	Overseers	120	960	[1]	Acting allowance to executive engineer.	300	300				
[1]	Acting allowance to executive engineer.	245	245	[1]	Acting allowance to executive engineer.	275	275	[3]	Acting allowances to assistant engineers.	40-60-80	170				
[32]	Local allowances to subordinates.	50	1,600	[36]	Local allowances to subordinates.	50	1,800								
80	Total .		50,255	79	Total .		48,048	83	Total		52,671	61	Total		46,232
	Total cost per annum	Rs. 6,03,060			Total cost per annum	Rs. 5,76,576			Total cost per annum	Rs. 6,32,052			Total cost per annum	Rs. 5,54,784	

These statements exclude the cost of specialist officers and of staffing special divisions. In the first three cases they include the establishment required to fill one chief engineership, an under-secretaryship, four circles, sixteen divisions, and forty-eight districts; in the fourth case one chief engineership, one post of personal assistant, ten inspectorships (each extending over one commissioner's division), and forty-eight districts.

APPENDIX A.

NOTE BY SIR NOEL T. KERSHAW ON THE FUNCTIONS OF THE LOCAL GOVERNMENT BOARD, ENGLAND AND WALES, IN RELATION TO PUBLIC WORKS.

It seems to be desirable to sketch, very briefly, the main principles which underlie the system under which the Local Government Board for England and Wales exercises its powers in regard to the control of the execution of public works and the expenditure thereon, to explain shortly what those powers are, and thus to draw attention to some of the main differences between the position in India and that in England and Wales.

2. The Local Government Board for England and Wales consists of a President and various other Ministers of the Crown but, as a matter of fact, the Board has never met and exists only on paper, the powers being exercised by the President, the Parliamentary Secretary, the Permanent Secretary and five Assistant Secretaries. Beside the Secretariat there is a clerical establishment and an audit establishment and there are numerous technical officers who act in an advisory capacity, such as engineering inspectors, medical officers and inspectors, architects, etc. These are not administrative officers.

3. So far as public works are concerned the main powers of the Board arise from the fact that their sanction is, speaking very generally, necessary to all loans for most classes of these works raised by local authorities outside London, except where Parliament, by means of local Acts, has given express power to borrow a limited sum for certain specified works without further sanction by the Board. In some instances, *e.g.*, loans for tramway or harbour works, undertaken by local authorities, the sanction required is that of the Board of Trade, but the great bulk of the loans raised without direct sanction of Parliament requires the sanction of the Local Government Board. The Board's power to sanction or refuse sanction to loans is absolute and, as local authorities seldom carry out works of any magnitude without resort to a loan, the power to refuse sanction to a loan is, in fact, more important than it would appear to be to those whose acquaintance is mainly with Indian practice. This will be appreciated when it is stated that out of a total expenditure by local authorities otherwise than out of loans amounting to just over 134 million sterling for the year 1911-12, nearly 31½ million sterling represents the charges for principal and interest in respect of loans raised, the balance being mainly maintenance and other revenue charges in respect of which loans could not be authorized. The second check on expenditure on public works arises in certain cases in connection with the Government audit which is dealt with briefly at the end of this sketch.

4. Attention should be drawn to the fact that the Local Government Board have, speaking generally, no concern with or control over local works constructed for and belonging to the Crown but only over works carried out by, and belonging to, local authorities. Public works belonging to the Crown outside London are few in number in England and Wales and consist mainly of such buildings as post offices, custom houses and such like which are provided by the Office of Works, and certain buildings on Crown lands managed by the Office of Woods, Forests and Land Revenues. These buildings are usually provided, in accordance with plans prepared by the Central Department concerned, by contractors for a lump sum or, in certain cases, on a schedule of prices or both. The Office of Works have a staff of architects and surveyors who supervise the execution of the works as well as prepare the plans. In some cases the works are carried out by direct administration, but this is usually where the work is a small one.

5. The principal local authorities are :—

(*a*) County Councils ;

(*b*) Poor law authorities, with which we are here very little concerned ,

(*c*) Urban authorities, namely, the Councils of Municipal Boroughs and Urban Districts ;

(*d*) Rural authorities, namely Rural District Councils;

(*e*) Joint Boards or other similar authorities set up for special purposes, *e.g.*, sewerage and sewage disposal, water-supply or the provision of hospital or asylum accommodation ;

(*f*) London, where the position is very exceptional and with which it is consequently not proposed to deal ;

(*g*) Parish Councils, which exist only in Rural Districts and mainly in Parishes which have a population exceeding 300.

6. England and Wales are divided for purposes of *County Administration* into Counties and County Boroughs. County Boroughs are those set out in the Third Schedule to the Local Government Act, 1888, and consist generally of Boroughs having a population exceeding 50,000 according to the Census of 1881, certain smaller Boroughs which had jurisdiction independent of the County Justices prior to 1888 and other Boroughs which have attained a population of 50,000 since the Act and have been made County Boroughs by Provisional Order of the Local Government Board confirmed by Parliament or by Local Act of Parliament. Counties for the purposes of the Act of 1888 are referred to as " Administrative Counties " and consist generally of the old geographical counties excluding County Boroughs and are governed for the purposes of that Act by County Councils. Some large Counties, such as Yorkshire and Lincolnshire, have a County Council for each " Riding " as it is termed in Yorkshire and for each " Part " as it is termed in Lincolnshire.

7. The powers of County Councils are concerned principally with main roads and important bridges (called County bridges), lunatics, feeble-minded persons and asylums for these, the provision of sanatoria under the National Insurance Act, 1911, police, small holdings, education (subject to the exceptions referred to in the note on page 95) and the provision of hospitals in certain cases. They also have certain powers in regard to the alteration of local areas (*cf.* section 57 of the Local Government Act, 1888). It may be taken that County Borough Councils are entirely independent of County Councils and have practically similar powers as regards their own area to those possessed by County Councils in the rest of the geographical county, in addition to the powers which the Council of the County Borough possess as a Sanitary Authority and a Municipal Authority. Further, certain Boroughs which are not County Boroughs continue to maintain their own police force and are independent of the County Councils in this respect also.

8. The powers of supervision by County Councils over District Councils — including Boroughs other than County Boroughs —are not very great. The County Council must appoint a Medical Officer of Health who receives the annual and other reports made by District Medical Officers of Health and advises the County Council upon them. He also makes his own independent investigations in his area and upon his reports or other information received the County Council can make a representation to the Local Government Board under section 19 of the Local Government Act, 1888, or a complaint under section 299 of the Public Health Act, 1875. The County Council have also powers of complaint of default against all District Councils under the Housing of the Working Classes Acts and in the case of Rural District Councils they can in certain circumstances take over and exercise the powers of the District Council for the provision of houses. It may be stated generally that County Councils are seeking to establish themselves as the superior Sanitary Authority in their County with general supervision over all District Councils and that the District Councils on their part resent the movement and have organized themselves against it. Nevertheless the policy

has made some progress, the tendency in recent years being to subordinate the areas governed by Rural District Councils and the smaller Urban District Councils to the County Council.

9. Turning now to administration by District Councils. These are divided into two main classes :—

(1) Urban District Councils (including Boroughs governed by Town Councils) ;
(2) Rural District Councils.

The whole of England and Wales, excluding the areas of County Boroughs, is divided into *Urban Districts* consisting usually of a single town or in a few cases of towns closely associated and nearly adjacent to one another and *Rural Districts* consisting of an aggregation of villages, or small towns which have not been made Urban Districts by the County Council under section 57 of the Local Government Act, 1888. The unit in the case of the Rural District is the Parish which consists of the village or town with the neighbouring lands. Some Parishes contain more than one village and practically every Parish in a Rural District having a population of 300 has a Parish Council. Urban Districts include Boroughs other than County Boroughs.

10. An ordinary Urban District (not a Borough) is now constituted and extended by Order of the County Council of the County in which it is situate, confirmed by the Local Government Board. A Borough is constituted by Charter granted by His Majesty in Council and can only be altered or extended by Provisional Order made by the Local Government Board and confirmed by Parliament or by Local Act. Apart from County Government the Borough is regarded as the highest form of Local Government in England and Wales and the highest form of Borough is, of course, the County Borough. All Boroughs have certain powers in regard to the administration of justice not possessed by other Urban Districts and as already pointed out some maintain a separate police force. In other minor matters also they have greater powers than other Urban District Councils. Urban and Rural District Councils are, speaking generally, the Sanitary Authorities of the County ; they provide the water-supply (where it is not provided by private enterprise), sewerage, scavenging, public lighting, pleasure grounds, fire appliances and infectious disease hospitals, and they maintain the roads and streets in their district. They are the main authorities for looking to the housing of the working classes and providing new houses where required. They make bye-laws as to the construction of new buildings and the provision of open spaces about buildings, nuisances and many other matters. (These bye-laws require confirmation by the Local Government Board.) The powers conferred on Rural District Councils by Statute are much less than those conferred on Urban District Councils, but under most Acts there is a power for the Local Government Board to confer upon Rural District Councils any power of an Urban District Council either in respect of their whole district or any Parish within it. This does not apply to powers exclusively belonging to Boroughs and not possessed by other Urban District Councils.

11. County Councils and Urban and Rural District Councils have, generally speaking, their own resources as well as Government grants. The expenditure of County Councils is defrayed out of the County Rate. The expenses are referred to as general or special according as they are levied over the whole administrative county or over a limited area of it. Special expenses, for example, will include expenses for police purposes where the Administrative County includes a Borough which maintains its own police. The expenses of an Urban District Council other than a Borough are defrayed out of the general district rate. In a Borough they are usually defrayed partly out of a borough rate, which provides for the expenses of administration of justice and most of the establishment charges, and partly out of the general district rate, out of which sanitary expenditure including that on roads) and housing expenditure is defrayed, but in some Boroughs only one rate is levied.

12. In England and Wales roads repaired at the public expense practically all vest in and are repaired by some local authority. Such roads are divided at present into two classes :—

(*a*) Main roads ;

(*b*) Other highways repairable by the inhabitants (of the district) at large.

Prior to the operation of the Local Government Act, 1888, there was a Government grant in respect of the cost of the maintenance of main roads, but that Act abolished any specific grant for the purpose of main road maintenance although an equivalent sum continued to be paid as an unappropriated grant so that the local authorities should not receive less from Government in the shape of Imperial grants than they had previously received. Main roads vest in County Councils who can declare ordinary highways to be " main " roads and with the concurrence of the Local Government Board may " dismain " what have been " main " roads.

13. The cost of the maintenance of main roads is defrayed by County Councils who either repair the roads themselves or contract with the District Council in whose area the road is situate to maintain it. In many cases, however, Urban District Councils exercise the right conferred by the Local Government Act, 1888, to retain in their own hands the maintenance of the main roads in their area, being repaid by the County Council the cost properly incurred in so doing. In case of dispute the amount to be paid is settled by the Local Government Board, usually after a public hearing in the locality at which all persons interested can attend and give evidence. A County Council may not make any payment to a District Council in respect of the cost of maintenance unless they are satisfied by the report of their surveyor that the road has been properly maintained and repaired. Although main roads at the time of the passing of the Local Government Act, 1888, were generally important means of through communication, this was by no means always the case and there were many anomalies both because important roads were not main roads and because unimportant ones were. This was due to the arbitrary nature of the definition of the term " main road " in the Highways and Locomotives (Amendment) Act, 1878. The then existing anomalies were made worse by the diversity of action taken by the various County Councils since 1889. In some Counties practically every through road has been " mained " so that the cost of highway maintenance has been diverted from the District to the County. In others practically no roads have been " mained " since 1889. County Councils can also contribute to the cost of maintenance of roads which are not main roads if they so desire.

14. The Departmental Committee on Local Taxation which sat in 1912-13 drew attention to these anomalies and proposed a scheme under which roads repairable by the public would be divided into three classes:—

(1) National roads,

(2) County roads,

(3) Other roads ;

and that the State should contribute largely to the cost of maintenance and improvement of the first class and to a less extent to the cost of maintenance and improvement of the second. The classification was to be done by the Road Board, which was set up by the Development and Road Improvement Funds Act, 1909, and was in progress at the beginning of the war. The Road Board was set up to administer funds arising from motor spirit duties and carriage licenses, handed over to them by the State, for the improvement of existing roads and the construction of new ones. So far the Road Board have expended their funds almost exclusively upon the improvement of road surfaces and foundations and only about £538,000 out of the total receipts of over £4,242,000 had been paid for the construction of new roads (Report of Road Board for 1915-16). The contributions given by the Road Board take the form of—

(*a*) grants,
(*b*) advances free of interest or at a reduced rate of interest.

They are given to encourage local authorities to undertake works which would not otherwise be undertaken or would be deferred, and are usually conditional upon considerable expenditure by the local authorities out of rates for the object for which the grants or advances are given. Thus the system is used to encourage the expenditure of money by local authorities on the strengthening and improvement of road foundations and surfaces. This system certainly results in the putting in hand of such works years before they would otherwise be undertaken and on possibly more substantial lines.

15. The total amount of loans sanctioned by the Local Government Board to be raised by Urban and Rural District Councils alone during the year 1913-14 exceeded 10½ million sterling. Of this sum over 1 million was sanctioned for the purposes of the Education Acts, *viz.*, the erection, improvement and equipment of schools of various descriptions.[*] The main objects for which these loans were sanctioned, apart from education, will be gathered from the list of Acts under which the sanctions were given set out below, except so far as loans under the Public Health Acts and Local and Confirmation Acts are concerned. These are analysed in the Table immediately below the list of Acts.

Urban Councils.

	England (excluding Monmouthshire).	Wales and Monmouthshire.
	£	£
Baths and Wash-houses Acts	84,199	305
Burial Acts	16,811	1,000
Electric Lighting Acts	1,932,258	120,600
Housing of the Working Classes Acts	638,050	38,858
Military Lands Act, 1892	1,000	
Museums and Gymnasiums Act, 1891	..	526
Public Health Acts and Local and Confirmation Acts	5,170,122	372,798
Public Health (Interments) Act, 1879	37,403	15,237
Public Libraries Acts	7,484	330
Small Dwellings Acquisition Act, 1899	61,440	39,277
Small Holdings and Allotments Act, 1908	28,577	2,608
Total	7,977,344	591,539

Rural District Councils.

	£	£
Electric Lighting Act, 1882	..	8,360
Housing of the Working Classes Acts	179,844	14,925
Public Health Acts and Local Acts	538,413	105,940
Small Dwellings Acquisition Act, 1899	7,000	9,000
Total	725,257	138,225

Analysis of Public Health Acts and Local Act Loans.

	£	£
Street improvements, making up private streets and constructing new streets and bridges	1,610,556[†]	158,400[†]
Sewerage and sewage disposal	1,606,524	114,453
Waterworks	523,774	88,107
Public walks and pleasure grounds	413,588	21,426
Gas works	383,586	33,913
Telephonic communication	192,423[‡]	..
Hospitals and mortuaries	176,841[§]	1,880
Public offices	127,362	5,754
Refuse destructors	89,164	39,838
Fire stations, engines and appliances	97,443	7,347
Conversion of privies into water closets	60,885	..
Depôts	49,270	1,920
Paying off existing loans	41,023	
Sea defence	27,707[‖]	..
Public sanitary conveniences	20,272	2,166
Steam road rollers and motors for highway purposes	15,373	515
Slaughter-houses	11,988	..

*Note.—(It should be remarked here that the Councils of Boroughs are local authorities for the purposes of Elementary Education where their population according to the Census of 1901 exceeded 10,000 and the Councils of other Urban Districts where their population according to the same census exceeded 20,000. In other areas the County Council are the education authority both for elementary education and for education other than elementary. The total amount sanctioned by the Local Government Board to be borrowed by County Councils in 1913-14 for elementary education was £871,855 and for education other than elementary £317,179.)

†The cost of making up private streets is, generally speaking, repayable to local authorities by frontagers.

‡This was the amount of a loan sanctioned to the Town Council of Kingston-upon-Hull for the purchase from the Postmaster-General of the telephone plant in the Hull Area.

§ These figures do not include the loans sanctioned for hospital purposes to Joint Boards and County Councils.

‖ These figures are approximate only, works of sea defence being frequently combined with improvements to the sea front which are not wholly necessary for protective purposes.

16. The loans raised by Joint Boards, which are combinations representing several districts for a particular object, are mainly for works of sewerage and sewage disposal, water-supply, gas-supply, hospitals and cemeteries. The total amount sanctioned to be raised by these bodies in 1913-14 was only £167,000. These figures exclude Poor Law loans.

17. The loans sanctioned to be raised by Parish Councils are trivial, amounting only to £31,819 in 1913-14. The powers of these bodies are very small and need not here be further referred to. As regards most of these powers the Rural District Councils of the area in which the Parish is situate possess parallel powers. Parish Councils require the sanction of County Councils as well as that of the Local Government Board before they can raise a loan.

18. A local authority requiring to raise a loan must submit to the Board the necessary particulars to enable the proposal, in respect of which the loan is required, to be investigated from the point of view of —

- (*a*) necessity or desirability in itself;
- (*b*) cost having regard to the other commitments or necessities of the district;
- (*c*) technical attributes.

For these purposes plans and other drawings, detailed estimates, a report on the scheme from the points of view indicated above and a return of existing indebtedness are required to be supplied, the drawings being signed by the architect or engineer as the case may be. In the majority of cases the schemes are prepared by the local authority's own surveyor who is frequently a more or less competent engineer, but in the case of large works of a complicated character the services of a private consulting engineer or of an architect are sometimes called in to prepare the scheme. The application for sanction is made by resolution of the local authority under seal.

19. When the application has been registered in the Local Government Board's office it is referred to the administrative branch which deals with the particular class of project concerned, and the papers are referred by them with the plans to the technical staff of the department usually consulted in regard to similar proposals. Before the reference is made the statements in the report on the scheme are verified, any relative papers are annexed and attention drawn to the need for other works of importance in the District concerned and to the possibility of alternatives for the proposed works so far as the information is available in the office.

20. Schemes for water-supply, sewerage or sewage disposal are referred to the Chief Engineering Inspector who is the head of the Engineering Department and decides which of his assistants shall look into the scheme at head-quarters. If the latter, on examining the scheme, finds that medical or architectural details arise which need expert consideration he will suggest a reference to the Medical Officer or Architect as the case may be

and even if he makes no such suggestion the Administrative Officer dealing with the case can, if he thinks it desirable, makesuch a reference. The Engineering Inspector to whom the scheme is referred for examination at head-quarters looks into it from the technical point of view and if he finds it *primâ facie* generally satisfactory says so and notes any points upon which he thinks improvements can be made or explanations are desirable. If the scheme is a bad one he explains on the papers why this is so and, if this is apparent from the drawings and other information supplied, suggests that the local engineer or other officer responsible is not fit to be entrusted with the design of such a scheme. Where the last is the case it is explained to the local authority that the scheme won't do and they are advised to employ a man accustomed to the design and execution of similar works. The Engineering Inspector at head-quarters also looks, with the assistance of any papers referred to him, into the question of possible alternatives to the scheme. For example, if the scheme is one of water-supply from a new source, he sees how neighbouring districts are supplied and whether they have water to spare which is satisfactory and which it is likely could be taken to the district needing a supply at a cheaper rate than under the proposed scheme. He would also see whether there are adjoining districts or villages needing supply to which it would be feasible, from an engineering point of view, to extend the proposed supply and notes his views on these points upon the papers. He next decides whether he can recommend sanction to a loan without local inquiry or whether such inquiry is desirable. If the loan is required merely for an extension of mains to an area where the plans show that such a supply is necessary he would usually recommend sanction without inquiry, particularly if the supply was known to be a good one and the engineer a capable man. On the other hand he would not usually suggest that a local inquiry should be dispensed with where the scheme was for a supply of water from a new source or the scheme involved points of engineering importance.

21. In ordinary times the head-quarters work of the Engineering Staff is divided between the Chief Inspector, the Deputy Chief Inspector and the Second Deputy. These men are all specialists in different lines of engineering and they have under them a travelling staff of Engineering Inspectors who are selected for appointment on account of their eminence as specialists in some branch of engineering which happens at the time to be, or to be likely to become, inadequately represented on the staff. Thus there are, on the staff of 16 travelling inspectors, specialists on gas, electricity, sea defence works, reinforced concrete, etc., and what are called in India sanitary engineers. These specialists are available to advise the head-quarters staff on any points upon which expert knowledge of a specialized character is desirable.

22. Assuming that the head-quarters engineer recommends a local inquiry and that the case is otherwise ready for such inquiry the case is sent to the Chief Engineering Inspector to fix a date for the inquiry and to allot it to a travelling Engineering Inspector to hold the inquiry. In selecting the travelling Inspector regard is had to the nature of the proposal and where a specialist is desirable he is selected to hold it. Every effort is made to group inquiries so as to save time and travelling expenses, but the need for assigning the inquiries in certain cases to specialists sometimes militates against this. The inquiry is advertised by printed placards posted in the district wherever public notices are usually posted, and sometimes in a more extensive area, and any persons interested are invited to attend and be heard. In certain more important cases notice of the inquiries is given by advertisement in a local newspaper. The posting and advertisement are done by the local authority. Usually a fortnight's notice is given. The inquiries are so arranged that, as far as possible, each Inspector shall take a week's inquiries followed by a week's reporting of the proceedings at the inquiries and the recommendations of the Inspector. Inquiries last from one to fourteen days or even more

but an inquiry does not often last more than one day and very seldom more than three.

23. At the inquiry the clerk to the local authority usually explains the object and nature of the proposal and calls the expert responsible as a witness, the Inspector taking part in the examination. Any other persons interested can ask questions in an order arranged by the Inspector and it is to be observed that these local inquiries are often attended by rate-payers' associations as well as owners of property and other rate-payers and advantage is taken of them to give expression to local public feeling and to indicate—often rather strongly—that a considerable body of the rate-payers and the Council of the District concerned are not quite at one in their views of the project. In some cases so strong is the feeling that the opponents go to the expense of retaining expert witnesses to oppose the project and even brief counsel with that object. The Inspector also goes into all points which he finds noted on the paper by head-quarters, whether they are of a technical nature or not, and discusses amendments of the proposals and any alternative plans which may occur to him, but is careful, in doing so, not to commit the Local Government Board to any approval of such alternatives or amendments. He calls for any additional evidence he may require and after the inquiry visits the site of the proposed works and any alternative sites which may have been suggested at the inquiry, inviting all persons interested, or their representatives, to accompany him.

24. Where the proposal is to build a sanatorium or hospital the procedure is on somewhat similar lines, but the case is referred to the Medical Officer and Architect instead of the Chief Engineering Inspector, and the inquiry is held by a Medical Inspector, a member of the Architect's staff or an Engineering Inspector being sometimes associated with the Medical Inspector as the case requires.

25. After the inquiry the Inspector makes his report. He deals first with the project as a whole in an explanatory way. He gives an abstract of the evidence at the inquiry, deals particularly with any points raised at head-quarters either on the administrative or the technical side and follows with his own criticisms and recommendations. In most cases some modifications are found necessary in the scheme as presented either in the interests of economy or efficiency, and in some cases the recommendation is that the scheme be rejected altogether either as unnecessary or not the best means of meeting what is required. For example, a local authority may submit an electrical scheme with a view to sanction being obtained to a loan. The scheme may include a generating station, but the evidence at the local inquiry or his own investigations may have convinced the Inspector that it would be more economical to obtain power from a neighbouring local authority or from a company and he will recommend refusal of sanction on this ground. The travelling Inspector's report goes to his technical superior, who, after conference if necessary with the Inspector, states his own views, if he does not concur with the Inspector in all respects.

26. The application then goes to the Administrative Branch for decision. If that decision is adverse, the local authority cannot raise a loan and though nominally they can proceed with the scheme and pay for it out of revenue (*i.e.*, current rates), this is most unlikely to happen where it would mean an addition exceeding 1*d.* in the £ to those rates. Rate-payers' Associations exist in many districts and the increase of rates to pay for a scheme which has been rejected after local inquiry would usually be most unpopular and probably lead to the defeat, at the next local election, of the members who advocated it. Although, therefore, there is not, speaking generally, any actual limit to the rate in the £ which a County Council or Urban District Council (including a Borough) or a Rural District Council may raise or levy to meet the cost of any object which they are authorized by Statute to provide, they will seldom be prepared to pay the cost of that object out of revenue if the rate-payers are likely to take the view that it is one the expense of which might properly be extended over a term

of years by means of a loan raised with the sanction of the Local Government Board.

27. If, on the other hand, the decision is favourable to the local authority, the Board give their sanction by means of a formal document, signed by a Secretary or Assistant Secretary, which is usually impounded by the lender of the money. Some loans to local authorities are advanced by the Public Works Loan Commissioners, a body of financial and other experts appointed by Parliament to lend State funds provided for that purpose by the National Debt Commissioners. The greater part of the sums advanced by the Public Works Loan Commissioners have been advanced to small local authorities or for objects for which the Commissioners are allowed to give exceptional terms as regards rates of interest and the period for repayment, *e.g.*, loans for housing the working classes or for the provision of small holdings. The greater proportion of local loans have in the past been raised in the open market either by means of Corporation or County Stock, or mortgages of rates. Large sums have been lent to local authorities by Insurance Companies and Friendly Societies and, prior to the war, a very favourite system of obtaining money was on short term loans repayable at six months' to three years' notice. The sums advanced on short term mortgage were usually advanced in small sums and at low rates of interest—some are outstanding even now at less than 4 per cent.—but the issue of Exchequer Bonds bearing higher rates of interest brought this style of borrowing almost to a standstill and there was some difficulty in obtaining the moneys necessary to provide for renewing the short term mortgages called in. It has been estimated that at the end of 1915 the short term mortgages (up to three years) still represented about £70,000,000 out of a total debt of about £400,000,000 (excluding London).

28. The Local Government Board have power in nearly every case in which they sanction loans to fix the period within which the loans shall be repaid subject to a maximum, usually 60 years. The period actually allowed is fixed with the object of limiting it as far as possible to the probable useful life of the work and with considerable regard to the principle that each generation should bear its own burdens. Consequently the most usual period for the repayment of loans in respect of works likely to have a useful life of at least 30 years is 30 years. In calculating the probable useful life of a work regard is had to the prospect of obsolescence as well as mere decay. Thus in the case of a comparatively newly-developed industry like electricity the periods allowed are shorter than the probable life of the work.

29. Loans are almost always repayable by one of three methods—

(1) Equal annual instalments of principal, interest being paid meanwhile on the balance of the loan from time to time outstanding.

(2) Equal annual instalments of principal and interest combined—practically a terminable annuity.

(3) Equal annual payments into a sinking fund which is invested in Trustee Securities and accumulated. The payments are calculated at a rate which will secure that at the end of the term allowed for the repayment of the loan the sum in the fund will be sufficient to effect repayment.

30. The growth of local debt under this system has been considerable. Thus in 1884-85 the local debt including London was approximately £171,000,000 or 24·0 per cent. of the then National Debt; in 1911-12 it was nearly £522,000,000 or 72·0 per cent. of the then National Debt. Looking at the matter from another point of view it may be stated that in 1884-85 the local debt was equivalent to £1 3*s.* 10*d.* per pound of rateable value and £6 8*s* 8*d.* per head of population. In 1911-12 it was equivalent to £2 11*s.* per pound of rateable value and £15 7*s.* 9*d.* per head of population.

31. As regards the income of local authorities (including London) this, excluding receipts from loans, amounted to about

£149,000,000 in 1913-14. Of this sum about £71,000,000 was from rates levied on the annual value of property assessed to rates, and about £22,600,000 was from Government Grants (including local taxation licence duties). The balance consisted mainly of receipts from property and remunerative undertakings, such as water-works, electricity works, gas works, tramways, markets, etc. In the same year the rates per pound of assessable value varied in the different Boroughs from 4*s.* 6*d.* to 11*s.* 3*d.* In one small Urban District the rates were at one time as high as 12*s.* 6*d.* in the pound.

32. Valuation for rating purposes outside London is generally conducted in the first instance by the Overseers of the Poor in each Parish. These officers are unpaid and in large Parishes the actual work is usually done by Assistant Overseers who are paid for their services. They value each new property on the basis of the rent which it is likely that the most suitable tenant would be willing to pay for it using it for the most suitable purpose, not necessarily the purpose for which it is in fact occupied or the rent at which it is in fact let. This value is called the gross estimated rental which is entered in the valuation list with particulars of the owner and occupier. The rateable value is the gross estimated rental less deductions for repairs, insurance and certain other outgoings, usually amounting to about one-sixth of the gross estimated rental. This is the value upon which the Poor Rate is levied, but under the provisions of the Agricultural Rates Act, 1896, agricultural land pays in respect of Poor Rate and other rates collected with the Poor Rate—such as the Borough Rate in Boroughs and the County Rate—a rate equivalent to a levy on half its rateable value. The rateable value is also the value upon which the General District Rate is levied, but agricultural land, wood lands, railways and canals or other land covered with water are rated for the purposes of this rate at one-fourth of their rateable value. In ordinary cases the rates are paid by the occupier of the rated premises.

33. It is out of the general district rate that the main expenditure of Boroughs and almost the whole of the expenditure of Urban Districts is usually paid. In Rural Districts the expenses are paid mainly out of the Poor Rate, which covers many other things besides the relief of the poor, but in cases where material expenditure for sanitary purposes, *e.g.*, water-supply, sewerage or scavenging, is incurred, there is a special expenses rate on the same lines as the general district rate in Urban Districts and with similar reductions in rateable value on agricultural land, etc., but limited to the Parishes in the District in respect of which the expenditure is incurred. The above is a very rough outline of the rating system intended merely to give a general impression of the system in force. It is subject to various modifications and qualifications in many directions.

34. It will be understood from what has been said that there is a powerful tendency on the part of those who pay rates to see that these rates are not unnecessarily increased. This tendency would be still more powerful if it were not for the fact that many large rate-payers have no voice in the election of the members of the local authority, *e.g.*, limited liability companies, railway companies, canal companies and so forth. On the other hand in the case of small dwelling houses the owner in certain cases pays the rates instead of the occupier and the occupier has consequently no direct incentive to economy in expenditure out of rates. He does not usually realize that rises in rents are frequently the result of rises in rates, and is not, therefore, averse to expenditure out of rates. Naturally the occupier of small dwelling houses is a numerous class and has much influence in local elections where he chooses to exert it.

35. There are from time to time cases in which a local authority refuses to do works which are necessary to put their district in proper sanitary condition or otherwise to carry out works which they ought to carry out. Provision has been made by Statute to meet some of these cases. Thus as regards default in keeping ordinary

Highway Act, 1835.

Public Health Act, 1875, etc.

highways in repair the remedy is by indictment of the local authority concerned or by complaint to the County Council under section 10 of the Highways and Locomotives (Amendment) Act, 1878. As regards sewerage and water-supply and certain other matters complaint may be made to the Local Government Board by any person interested that the local authority have made default in providing their district or any part of it with sufficient sewers, or with a proper water-supply where danger arises to the health of the inhabitants and a proper supply can be obtained at a reasonable cost. On receipt of such a complaint the Board hold a local inquiry and if satisfied of the default may make an order, limiting a time for the completion of the necessary work, which is enforceable by writ of *Mandamus* from the High Court, or they may employ some person to do the work and collect the money as a receiver of the rates. This latter course is never resorted to in England. It would be very inconvenient and the remedy by *Mandamus* has been found simple and effective in the few cases in which resort to it has been necessary. Usually the issue of the Board's formal order or even the threat of it is sufficient. There are also a few cases in which the Board can issue an order requiring work to be undertaken without complaint from persons interested in the locality. Thus the Public Health Act, 1875, provides that Urban and Rural District Councils may, and if required by the Local Government Board shall, undertake the scavenging of their district, *e.g.*, the cleansing of closets, privies, cesspools, etc. In this case also the order is enforceable by *Mandamus*. There are many other matters, *e.g.*, housing of the working classes or the clearance of slum areas or town planning, which in certain circumstances may become duties of local authorities enforceable by order of the Board and if necessary by *Mandamus*.

See the Housing Acts and particularly the Housing, Town Planning, etc., Act, 1909.

36. It is generally recognized, however, thati it is difficult to exercise successfully any powers of compulsion n respect of local authorities unless there is a certain amount of public opinion in favour of progress in the particular direction to be enforced upon the local authorities. The suggestion so frequently made in Parliament and the newspapers that all that is required to secure progress, of a character for which public opinion is not ripe, is to turn the word " may " in Acts of Parliament into " shall " is based upon a serious misapprehension of the possibilities of local and central government in England and Wales. The Departmental Committee on Local Taxation which has already been referred to no doubt recognized this, for they thought that, in addition to the remedy of default orders, dealt with above, it might be well to have a stimulus in the way of an Imperial grant for sanitary purposes —including housing of the working classes—the whole or part of which could be withheld in the event of a serious failure on the part of a local authority to fulfil the statutory duty in any of these respects. The matter was under consideration when the war began and it was at that time proposed to give effect to the main principle of this recommendation of the Committee.

37. The last question to be touched on is that of Audit. All the accounts of all County Councils, all Urban Districts other than Boroughs, all Rural District Councils, all Boards of Guardians (Poor Law Authorities), nearly all Joint Boards and all Parish Councils and the Education accounts of all Boroughs, including County Boroughs, are audited by an officer appointed by the Local Government Board and styled a District Auditor. For the purpose of these audits England and Wales is divided into Audit Districts, the District Auditor for a district being required to live in his district or in some adjacent centre convenient for working his district. The County Council Audits are at present assigned to a group of District Auditors who practically confine themselves to this work. The audits are held yearly or half-yearly as the accounts are made up yearly or half-yearly. Thus

Urban District Councils accounts are made up yearly and those of Guardians of the Poor half-yearly.

38. The District Auditor gives public notice of the date and place fixed for the audit of accounts by him and any rate-payer or owner of property can attend and object to any item in the accounts. The accounts must be presented to the District Auditor duly made up and balanced and they must have been open to inspection of all persons interested for seven clear days before the Audit. The District Auditor may require the production of all books, and any rate-payer or owner of property in the district may be present at the audit and may make any objection to such accounts before the Auditor, such rate-payers and owners having the same right of appeal against allowances by the Auditor as they have by law against disallowances. The District Auditor is required to disallow every item of account contrary to law and surcharge the same on the person making or authorizing the making of the illegal payment and to charge against any person accounting the amount of any deficiency or loss incurred by the negligence or misconduct of that person or of any sum which ought to have been but is not brought into account by that person. He is to certify in every case the amount due from such person and, if required, to state his reasons for his decision, whether it be an allowance or a disallowance. Sums so certified are required to be paid to the Treasurer of the local authority within 14 days of the date of the District Auditor's certificate unless an appeal is made against the decision. An appeal can be made either to the High Court, on a writ of *certiorari*, or to the Local Government Board, who can, if they think fit, remit any surcharge if they find that the surcharge was legal but that the circumstances are such that remission would be justified. Naturally appeals are seldom made unless—

(1) it is considered that the Auditor's view was wrong in law or in fact; or

(2) the circumstances are such that the Local Government Board are likely to remit the surcharge.

There were over 2,000 disallowances and surcharges during the year ended March 1914. The number of appeals dealt with by the Local Government Board during that year was 593. In the case of 457 of these the Board confirmed the Auditor's decision but remitted, where a surcharge had been made. In 42 cases they confirmed but refused to remit. In 20 cases the Auditor's decision was reversed. The other cases were variously dealt with according to merits.

39. The general statutory provisions as to the audit of accounts of Boroughs other than Education accounts are contained in the Municipal Corporation Act, 1882. These provide merely for an audit of the Treasurer's accounts by two auditors, one appointed by the Mayor of the Borough and the other by the Burgesses (or rate-payers). These auditors have no power of surcharge and the audit is naturally rather perfunctory. To such an extent is this the case that in a few cases Boroughs have promoted private bills in Parliament or applied to the Local Government Board for the issue of Provisional Orders, to be confirmed by Parliament, putting them under the Government audit by District Auditors. The procedure by provisional order is only possible where there is in existence a local Act which can be amended under section 303 of the Public Health Act, 1875. In other cases Boroughs appoint professional auditors to audit those of their accounts which are not subject to audit by the District Auditor. This non-Government audit is generally very thorough, but these auditors have no statutory position as a rule and cannot surcharge.

APPENDIX B.

IMPROVEMENTS OF PROCEDURE.

Part I.—Public works department accounts.

Proposed simplification of the public works department accounts system.

1. Under the existing system the executive engineer is the officer responsible for the detailed accounting of all expenditure on public works within his jurisdiction. In some provinces he even disburses payments for works executed by his sub-divisional officer, while in others the sub-divisional officer maintains the primary records of account which are submitted by him to the executive engineer for incorporation in the accounts of the division. The divisional accounts are compiled in the executive engineer's office with the help of an accountant, and are sent to the audit officer by a specified date in the month following that to which they relate. P. W. D. Code, Vol. I, para. 1357. It is laid down that, unless the circumstances are very exceptional, the executive engineer in charge of the division shall always sign the monthly accounts himself after thorough examination of the books and documents from which they have been compiled, but that should the requirements of his work render the presence of the executive engineer at his head-quarters when the accounts are due for despatch a matter of inconvenience, they may be signed by the accountant. P. W. D. Code, Vol. I, para. 1359. In such cases the executive engineer, as soon as he can examine the books and papers, forwards a certificate of responsibility to the audit officer, and until this is received the latter cannot finally pass the accounts.

This system of accounts has been criticized by the majority of the officers of the public works department who have given 1(xi). evidence before us. It is urged that the time which the executive engineer is required to devote to his accounts work is excessive, and that the monthly compilation interferes seriously with the executive work of the division. Since the amalgamation of the public works accounts with the civil accounts the time allowed 1(x). for compilation has been reduced, and it is stated that the simplification of procedure has not been commensurate with this 1(ix). reduction of time. It is also urged that the majority of forms submitted with the monthly accounts are of no practical utility to the executive engineer as regards the control of expenditure within his division. We are convinced as a result of our investigation that the executive engineer and his office staff are required at present to devote too much time to the accounts work and that, in the interests of executive efficiency, some measure of relief is needed. We agree that the divisional officer must be responsible for all disbursements within his division, but we do not consider that he should necessarily be called upon to compile the records of these disbursements in such a form that they can be directly incorporated in the general accounts of the province. This latter duty appears to us to be that of the audit office rather than of the engineer. Three proposals have been made in order to provide 1(v). a remedy. The first involves the creation of a separate accounts branch of the divisional office in the independent charge of the accountant, which would compile all documents relating to the accounts and for the working of which the executive engineer would have no responsibility. We consider, however, that the creation of a separate and independent branch in the executive engineer's office, over which that officer would have no control, would be objectionable in principle, and in addition the scheme would entail the employment of accountants of superior status to those at present entrusted with the work under the general control 1(vii). of the executive engineer. The second proposal contemplates the transfer of the accounts from the executive engineer's to the superintending engineer's office. This scheme also appears to 1(viii). us unsuitable since, as pointed out by the comptroller-general, while the executive engineer must necessarily continue responsible for his expenditure and that of his sub-divisional officers, he would be deprived of the immediate control of the sub-divisional accounts and also of important accounts records which he requires to enable him to exercise the necessary financial check on his outgoings. It also appears very doubtful whether the superintending engineer is in a position to exercise as close a check over works accounts as the executive engineer, and whether the system would not result in an increase of work all round owing to the numerous references to the executive engineer which would probably be entailed. From the executive point of view the scheme appears to possess no special merit, while the comptroller-general opposes it from that of audit. The third system is that now in force in Bengal, under 1(i). which the compilation takes place in the central audit office. In framing this system two objects were kept in view, to abolish the submission to the accountant-general of all accounts and returns which were not essential to audit and compilation, and to transfer as much of the work as possible to local audit on the spot. A large number of forms were abolished and now merely the payment vouchers and book entries are submitted to the accountant-general. In consequence the executive engineer is enabled to forward his accounts for audit on the 5th of the month following that in which the expenditure is incurred, and the number of forms required is reduced to five or six as compared with the twenty or thirty necessitated in other provinces. We have been told both by the account- 1(ii). ant-general, Bengal, and by the executive of the public works department, that the scheme is working satisfactorily and that the apprehensions originally expressed that the reduction of forms was too drastic and that local audit would prove unsatisfactory have been shown to be groundless. The comptroller-general 1(iv). informs us that a scheme for general introduction throughout India is in course of preparation and that the general lines of the Bengal system are being followed, except that certain returns and books, abolished or relegated to local audit in Bengal, are being retained. These returns and papers appear, however, to us to be exactly those the compilation of which involves the most labour on the part of the divisional staff, including as they do the rent returns, cash and stock abstract books, account current, and schedule of expenditure, and we cannot but feel that their retention will deprive the Bengal system of some of its chief merit. As both the accountant-general, Bengal, and the chief engineer assure us that the experience of five years' working has shown that the system at present in force in that presidency satisfies the requirements both of audit and of the executive, we recommend that it be made of general application throughout India and deprecate the addition of any forms to those now maintained, or the submission to monthly audit of any returns now audited locally.

Pre-audit.

2. Our attention has been called to the procedure at present 70(i). in force in connection with the accounts for the construction of the new capital at Delhi, under which the bills for work executed are sent, before payment, to the audit officer who checks them, enters them in the registers, and himself makes the necessary disbursements. Under this system the executive engineer is relieved from all accounts work, receiving such information as may be necessary for the control of his expenditure, or for professional purposes, from the audit office. While we realize that this arrangement would prove impossible where works are scattered over large areas, there would appear to be no obstacle to its adoption in connection with works in the presidency towns or at the headquarters of local Governments where audit offices already exist, and it might also prove possible to institute temporary offices for this purpose at the site of large works, as was done in the case of the Sara bridge project. In view of the relief afforded thereby to the executive we recommend that, wherever possible, the preaudit system should be introduced.

Maintenance of accounts by sub-heads.

3. Under the existing system the accounts for works are, in P. W. D. Code, most cases, maintained by sub-heads, the only exception being Vol. I, para. that the outlay on works costing less than Rs. 5,000 need not 1290. be kept by sub-heads unless specially ordered by the sanctioning officer, and that no sub-head need be separately detailed in the

1(xii). register the amount of which is less than Rs. 500. The object of the maintenance of accounts by sub-heads is stated, from the point of view of the executive, to be twofold, firstly to enable the executive engineer to watch the progress of each work, and secondly to assist him in the revision of the standard schedule of rates. It appears to us that, in the case of small works, the advantages obtained from this procedure are incommensurate with the labour involved, since in such cases the executive engineer can control his expenditure by comparison with the total of the estimate, while the rates obtained from the register of works, which should agree fairly closely with those entered in the contract documents, 1(xiv). can hardly affect those obtaining in the divisional schedule. We therefore recommend that no sub-heads should be maintained in the case of works costing less than Rs. 10,000 and that in the absence of special orders to the contrary by the executive engineer no sub-head amounting to less than Rs. 1,000 should be separately detailed.

Profit and loss accounts of quasi-commercial undertakings.

4. As stated in Chapter IV we have, during our inquiry, attempted to investigate the financial status and prospects of certain quasi-commercial government undertakings such as brick-fields, workshops and stores. We have experienced great difficulty 72(i). in this respect in that no regular profit and loss accounts are maintained and hence it is impossible to tell accurately to what extent they are successful from a commercial point of view. In many cases no regular debit is made for charges such as interest, depreciation, direction and the like, and the success or otherwise of the undertaking is judged by a comparison between the value of the output and the direct working expenses, which often gives but little idea of the real financial position. While realizing that the preparation of annual profit and loss accounts would throw a considerable amount of extra work on both the executive and the accounts department, we consider it desirable that government should from time to time ascertain the financial position of such of these undertakings as it may be considered desirable to maintain, and we recommend that such profit and loss accounts should be periodically supplied, say at five year intervals, and that the advisability, from a commercial stand-point, of continuing the particular undertaking should be reconsidered.

Audit objections.

5. Our attention has been called to the large proportion of public works expenditure which is held in objection in audit. In the year 1914-15, of a total expenditure in the buildings and roads branch of Rs. 9¼ crores, Rs. 3¼ crores or 35 per cent. were held in objection. The main classes of objections are want of or excess over estimate, want of or excess over appropriation, and miscellaneous irregularities. The majority of cases of want of estimate are due to works, informal approval to which has been obtained, being commenced before the estimate is officially sanctioned and we anticipate that, when enhanced powers are delegated to superintending and executive engineers, and the delay at present necessitated in obtaining superior sanction consequently obviated, there will be a large decrease in the number of such objections. Similarly the adoption of our recommendation that executive engineers should be empowered to reappropriate funds should dispose of most of the objections under excess over appropriations. 7(ii). In regard to miscellaneous irregularities it had been stated by the executive that the percentage is swelled by reason of the fact that objections are raised in audit with reference to items which would have been passed without comment by an accounts officer with any professional knowledge, that expenditure is challenged the necessity for which can only be determined by the executive, and that the compilation of replies entails unnecessary labour on the part of the officers concerned. We realise the necessity for a proper audit, and we therefore refrain from making any 7(iii). detailed recommendation on this point. The comptroller-general informs us that efforts are being made to reduce this class of objection, and that orders have been issued that objectionable item statements shall in every case be scrutinized by a responsible officer. If this scrutiny is properly carried out, and if it is

impressed on all officers engaged in audit that objections should only be raised where there is genuine reason to believe that the expenditure was objectionable, and that the raising of unnecessary objections will reflect unfavourably upon the officer responsible, we do not consider that any further action is necessary.

Peripatetic audit.

6. It has been suggested that large numbers of the objections 66(i). raised in audit would be rendered unnecessary by the introduction of a system of peripatetic audit, since this would afford opportunity for personal discussion between the audit and executive officers and thereby obviate correspondence and explanation. While realizing the advantages of the travelling audit system we are not 66(ii). convinced that, in this particular case, they would be commensurate with the extra expenditure involved. It would often be inconvenient for an executive engineer on tour to return to headquarters to meet the auditor, and the majority of the questions would probably necessitate reference to sub-divisional officers and subordinates, who in many cases would be stationed at considerable distances from headquarters. It appears improbable that any very appreciable number of objections would be finally disposed of at such a meeting, while in all other cases a record of objections would be required as at present to ensure the necessary action being taken. We consider that it will be sufficient if, as is now the case in Bengal, the monthly submission of certain registers and returns to the accountant-general is discontinued and these returns relegated to local audit.

System of treasury payments.

7. Certain officers of the public works department have stated 98(i). in evidence that the system of treasury payments of personal claims introduced into the department at the time of the amalgamation of the public works with the civil accounts, is inconvenient and unnecessary, and that the old public works system of direct payment by the executive engineer was preferable. We cannot agree with this contention. The system of treasury payments is in force in every other department, and we consider that it should be retained in the public works department also, the differentiation between payment of personal claims and payments for works appearing to us to be desirable.

Lapses of grants and suitability of the date of the financial year.

8. Considerable stress has been laid by the officers of the public works department on the inconvenience arising from lapses of grants at the end of the financial year. It has been represented 44(ii). that the present date of closing the financial year is unsuitable, so far as the department is concerned, since it falls in the middle of the working season and it is extremely difficult to forecast how much of the season's expenditure will be incurred before, and how much after, the 31st of March. A further disadvantage of the 44(i). adoption of this date is that the department is not aware until April at earliest what works will be included in the budget, with the result that little or no progress can be made before the commencement of the monsoon and that hence the commencement of work is delayed and all allotments cannot be fully expended. Whilst we consider that from the departmental point of view the date is undoubtedly unsuitable, we recognize that, from the standpoint of general imperial finance, wider interests are involved, and hence we recommend no change. The recent orders of the Government of India in regard to the regrant of lapses should effect a considerable improvement, and no further action in the matter appears to us to be necessary.

Part II.—Decentralization.

Powers of technical sanction.

9. In dealing with the general question of financial and technical Decentralization control, the Decentralization Commission reported that the dis- Commission cretion given to local Governments in regard to the delegation of Report, para. powers of technical sanction to public works department officers 210 (VI). had been very sparingly exercised, and that there had been well founded complaints as to the unnecessarily rigid limits imposed, and they recommended that local Governments, in making such delegations, should bear in mind that the position of a superintending engineer should rightly be that of a local chief engineer for most engineering matters within his circle, the functions of

the chief engineer being to deal only with the more important estimates and to exercise general control over the department. With this object in view they proposed that local Governments should be allowed full discretion in delegating powers of professional sanction to their subordinate officers. The Government of India P. W. D. Code, Vol. I, paras. 283 and 321. however, decided to fix maximum limits of Rs. 50,000 and Rs. 2,500 for superintending and executive engineers respectively, at the same time expressing their willingness to reconsider the former limit should enhancement prove to be desirable. We consider 93(i). that some local Governments have still neglected to delegate adequate powers. In one province, where powers are delegated individually to superintending engineers, we found two such officers exercising powers of technical sanction limited to Rs. 20,000 up to the very date of their promotion to chief engineerships, and in some other provinces the powers of officers are restricted to sums 93(iii). much below the maximum limit. It has been suggested to us that this system favours the less efficient, since it permits of a local Government promoting an officer not fully qualified and protecting itself from the natural results of its action by restricting his powers, 93(ii). and that it also gives rise to unnecessary references by executive and superintending engineers to higher authority. We are convinced by our inquiry that officers have not hitherto been allowed to exercise powers commensurate with their professional skill and experience, that this has prejudicially affected the efficiency not only of the department but also of its officers, and that this evil will be intensified by a more rigid system of promotion. We therefore recommend that the powers of technical sanction of these classes of officers should be raised to the limits given in the statement attached to this appendix. We consider that every officer should exercise the powers allotted to his class, or to the class in which he may be officiating, unless for reasons recorded they are withheld by the local Government in the case of any particular individual. The rule should be that no officer should be considered fully qualified for promotion to a higher class until he can safely be entrusted with the full powers allotted to that class. The large difference between the powers proposed for superintending engineers and for executive engineers is based not only on the relative seniority of these officers, but also on the fact that in the case of a work sanctioned by a superintending engineer two professional opinions are recorded, whereas in the case of a work sanctioned by an executive engineer there is usually only one.

Delegation of powers to sub-divisional officers.

10. As we have already pointed out in our report, the importance of the sub-divisional officer does not appear to have been sufficiently recognized in the past, with the result that some of these posts have been filled by men of inadequate status and attainments, and the main responsibility for the detailed management of works has been thrown on the executive engineer. We believe that the introduction of a better type of sub-divisional officer will lead not only to greater efficiency but to greater economy, and also relieve the divisional engineer of much of the petty work which now devolves upon him. To attain this latter object we recommend 90(i). that certain limited powers should be delegated to assistant engineers and sub-engineers when in charge of sub-divisions, which powers should be extended to all officers of the proposed second service if our recommendation in regard to the formation of such a service is accepted. In the case of assistant engineers we consider it particularly desirable that they should be given this measure of responsibility before being called upon to exercise the higher powers which will vest in the executive engineer.

Powers of acceptance of tenders.

Decentralization Commission Report, para. 209 (V).

11. The Decentralization Commission recommended that local Governments should have full powers to accept tenders and pass contracts so long as the estimate sanctioned for the work by competent authority was not exceeded, and should be authorized to delegate such powers as they thought fit to authorities subordinate to them, subject to the general principles that the power of any officer should be limited to his power to deal with estimates professionally, that the contract did not involve indefinite legal liabilities, and that great caution should be shown in regard to

any delegation of power to make a departure from the ordinary rule that tenders should be publicly called for and the contract given to the lowest satisfactory bidder. As a result of these recommendations, provincial Governments have been empowered to accept tenders up to the limits of the estimates sanctioned by competent authority in the case of works charged to provincial funds, but their powers to accept tenders are still restricted to the limit fixed for their powers to sanction estimates technically in the case of works charged to imperial funds. P. W. D. Code, Vol. I, para. 757. Superintending engineers are authorized to accept tenders up to the limit to which those officers are empowered to sanction estimates technically, and executive engineers up to a limit of Rs. 5,000. We consider that these powers should be considerably enhanced. There appears to us to be no adequate reason why the power to enter into contracts 20(i). should be restricted to that of technical sanction, and there are indications that the preference shown by the department for piecework agreements as opposed to legal contracts is partly due to the delay entailed in obtaining sanction to the latter. Until the present year every contract for an imperial work costing more than Rs. 2 lakhs had to be submitted to the Government of India for acceptance, and consequently, after a suitable contractor had been found and his tender approved by the local authorities, it was necessary for the executive engineer either to postpone commencement of the work until the tender had been passed, through the superintending engineer, the chief engineer, and the local Government to the Government of India and back again through the same channel, or to start work without a contract at all, substituting a temporary piecework agreement and running the risk of the contractor throwing up the work if alterations in the contract were made by the higher authorities. The enhancement of the powers of local Governments to sanction estimates professionally will materially reduce the number of such references, but we would go further and recommend that, provided the estimate sanctioned by competent authority is not exceeded, the superintending engineer should, subject to the statutory rules, P. W. D. Code, Vol. III, App. 18. have the final disposal of all contracts. This will enable contractors' tenders to be accepted without delay and will, we believe, lead to a more general use of the contract system. We recommend also that the powers of executive engineers in this respect should be enhanced and that powers should be delegated to assistant engineers and to sub-engineers in charge of sub-divisions. The details of our recommendations are given in the statement attached to this appendix. The question of calling for tenders and the choice of bidders, referred to by the Decentralization Commission, has been dealt with in Chapter IV of our Report.

Purchase of tools and plant.

12. We also recommend an increase in the powers of superintending and executive engineers to sanction the purchase of tools and plant as detailed in the statement attached, their present 97(i). powers being unnecessarily restricted. Assistant engineers and sub-engineers in charge of sub-divisions should also be given such limited powers in this respect as will enable them to purchase such articles as may be required for works sanctioned by themselves.

Payments by sub-divisional officers.

13. In some provinces the sub-divisional officer is not entrusted 90(iii). with the duty of a disbursing officer, his power to make payments being restricted to petty items costing less than Rs. 10, all payments exceeding this amount being made by the executive engineer. We consider that such restriction is unnecessary and causes inconvenience to small contractors on works situated at a distance from the executive engineer's head-quarters. The sub-divisional officer should be looked upon as the primary disbursing officer of the department and should be responsible for all payments on running bills and also for all final bills except those for large and complicated works the checking of which by a more competent agency than the sub-divisional clerical staff may be considered desirable.

Reappropriation of budget allotments.

14. The question of simplifying the existing procedure in regard to the reappropriation of budget grants is one upon which a considerable amount of evidence has been received. At present,

if an item is specifically entered in the budget estimate, the allotment made cannot be reappropriated without the sanction of the local Government, so that if the executive engineer finds towards the end of the year that he is unable to expend in full the grant for any particular work he is unable to transfer funds from it to another on which progress may be possible without government sanction, intimation of which will often not be received until the money has lapsed. In order to avoid such lapses it is not uncommon for the executive engineer, finding it impossible to spend upon a work the grant allotted for it, to overspend on another in anticipation of sanction to a reappropriation of funds, the expenditure being meanwhile held in objection in audit as excess over allotment. As
10(i). a remedy for this state of affairs the accountant-general, Bengal, has proposed the abolition of allotments to executive engineers. Under his proposed scheme lump sum allotments would be made to superintending engineers for civil works within their circles. The superintending engineer would not allot money to each division or work, but would keep it in lump, booking the outlay against this lump sum and watching the rate of expenditure by means of monthly progress reports from the divisions. If he found himself running short of funds he would either ask the chief engineer for more or direct his executive engineers to retard operations ; if he found the rate of outlay too slow he would sanction further works, or endeavour to expedite progress on existing works. The executive engineer would thus not be responsible for keeping his expenditure within the limit of the allotment for each work, but merely for getting work done ; having no allotment he would not have to make efforts to spend it nor, on the other hand, would he have to curtail progress to avoid a technical objection to a small excess. Whilst this proposal has several features to recommend it, we are
10(ii). not prepared to support it in its entirety. The comptroller-general has pointed out some of its difficulties—the danger of excess expenditure on unimportant works at the beginning of the year, the tendency to convert the superintending engineer's office into an audit office, and the difficulty in which the superintending engineer would find himself in regard to works sanctioned during the year by the executive engineer ; and we concur with the comptroller-general's opinion that the divisional, and not the circle, officer should be responsible for exercising financial control over the expenditure on works, as being the officer more closely connected with the initial accounts. The lack of elasticity inherent in the present system is, however, undoubtedly prejudicial to efficient working, and we recommend the following modification which we believe will secure most of the advantages claimed for the scheme outlined above but without the concomitant disadvantages. Allotments should be made to the executive engineer as at present against individual works, but that officer should be empowered, if he finds that it is impossible to spend economically the grant sanctioned for any work in full, to reappropriate and transfer it to some other work, reporting the transfer and his reasons for making it to the district officer and to the superintending engineer (who will inform the heads of the departments concerned). The executive engineer will thus obtain much greater freedom than he has at present in the matter of adjusting his work to the varying conditions of labour throughout his division, while at the same time remaining responsible that the total sum available for expenditure within his jurisdiction is not exceeded. It will probably, however, be found advisable in practice to restrict this power to reappropriations within the four main heads buildings original, buildings repairs, communications original and communications repairs, and to prohibit the executive engineer from transferring money from one of these main heads to another without the sanction of the superintending engineer with whom the final decision in such matters should rest.

Disciplinary powers of officers of the P.W.D.

15. Under the existing system the control of the staff of the public works department is almost entirely centralized in the local Government. No officer is authorized to dismiss any servant of government whose appointment requires the sanction of higher

authority, and the upper subordinate establishment in every province, and in many provinces the lower subordinate establishment also, is appointed by the local Government. Under the present rules an executive engineer cannot punish in any way a lower subordinate employed in his own division. We have received much evidence to the effect that this procedure is detrimental to 25(ii). the efficiency of the department. We consider that larger disciplinary powers should be delegated to officers of the department 25(iii). and recommend that executive engineers should have powers of punishment, including dismissal, over the lower subordinates employed within their divisions, subject to a single appeal to the superintending engineer, and that superintending engineers should have similar powers over the upper subordinates employed within their circles, subject to a single appeal to the chief engineer. We believe that the adoption of this proposal will lead to greater efficiency in the subordinate ranks, and see no reason to believe that any hardship to the individual will be involved thereby, if it is laid down that in every case strict attention should be paid to the general rules regulating the dismissal of government servants.

Increase in the five per cent. limit allowed in estimates for contingencies.

16. It has been represented to us that the limit of 5 per cent. 19(i). which may, under the existing rules, be added to the estimate for a work to cover unforeseen and contingent charges might with advantage be raised, in order to avoid the necessity for explanations of excesses and for revised estimates in many cases. We are unable to support this recommendation, which might lead to less accurate preparation of the detailed estimate and to less careful control of expenditure. No explanation nor revised estimate is necessary unless the original estimate, including contingencies, is exceeded by more than 5 per cent. so that the engineer has already a margin of 10 per cent. for unforeseen charges and this, in our opinion, should suffice for any ordinary work.

Part III.—Modifications recommended in certain orders of the public works department code.

Advances to contractors.

17. It has been represented to us that in many cases the rates 4(i). at which work is done for the public works department by petty contractors are unduly enhanced by the fact that payments in advance are prohibited by rule and that hence the petty contractor, who possesses no capital of his own, is forced to borrow from money-lenders at exorbitant rates of interest, which is eventually paid by government in the rates for the work, and it has been suggested that the executive engineer should be empowered to grant advances. This proposal would affect only the smallest and poorest class of contractors, in whose case the risk of loss to government would naturally be greatest, and we are hence unable to recommend its adoption. A further suggestion 65(i). which has been put forward is that the executive engineer should be authorized, even when the contract is for finished work, to make payments against the security of materials actually brought to site. There is less objection to this proposal, and we recommend that executive engineers should be permitted to make payments of part value of materials on site, provided they are of an imperishable nature and that the agreement is so drawn up that government secures a lien on the materials paid for and is safeguarded against losses due to the contractor postponing the execution of the work after receiving payment for the materials, against losses due to their shortage or misuse, and against the expense entailed for their proper watch and safe custody. The monetary help so given should be treated, not as payment for the materials, but as advances made on the security thereof.

P. W. D. Code, Vol. I, para. 779.

Payments on account.

18. A question somewhat allied to the above, although standing on a completely different footing, is that of payments on 65(ii). account for work actually done. The present rules prohibit any payment being made without detailed measurements being recorded so that, if the engineer desires to pay on account for half the work executed, he is debarred from doing so unless he actually measures half the work in detail and enters the measurements in the measurement book. This appears to us to be an unnecessary restriction,

P. W. D. Code, Vol. I, para. 964.

and we recommend that payments on account for work actually executed should in ordinary circumstances be permissible without the formality of detailed measurements, on the certificate of a responsible officer (not below the rank of sub-divisional officer) that not less than the quantity of work paid for has actually been done.

Estimates for annual repairs to buildings.

19. It appears to us that, under the present system, a great deal
of unnecessary time and labour is devoted to the preparation of
the estimates for the annual repairs to buildings. These estimates
76(ii). are, in many cases, drawn up before the officer concerned knows
what repairs will actually be required, and are in practice not
76(i). closely followed. In some provinces standard measurement books
are maintained, containing the detailed measurements of each
building, from which these estimates are prepared, but even in
this case each separate estimate (and there may be hundreds
pertaining to a single division) has to be submitted to the executive
engineer for formal sanction. It does not appear to us that this
76(iii). procedure affords any real control over expenditure and hence we
recommend the abolition of these repair estimates. A lump
sum should be fixed for each building, based on the average expenditure of the previous five years, and up to this limit expenditure
should be permissible without the formality of further sanction.

Definition of original works and repairs.

P. W. D. Code, Vol. I, para. 645.

20. As defined in the public works department code the replacement of any portion of an existing structure by work which
in material essentials is not the same as the work dismantled is an
original work, and funds for the same must be provided from the
minor works grant and not from the repairs grant, and it has been
suggested that the definition might advantageously be made less
76(v). rigid. An extreme case quoted to us was that of a church in Assam
which the local Administration was empowered to re-roof with
similar materials to those originally employed, whereas the sanction of the Secretary of State was required to its re-roofing with
cheaper and more satisfactory materials, the former being a
repair and the latter an original work within the meaning of the
76(iv). code. We agree that the present rule is unnecessarily restrictive
and recommend that it should be revised so as to permit of renewals and replacements being classed as repairs, even if executed
with different materials from those employed in the original work
(such as the substitution of a flagged for a concrete floor), provided
that the cost is not more than that for which the renewals could
have been carried out in the materials used in the original work.
The present rule appears to us to deter the department from
taking advantage of the more recent developments in materials
and economical constructional methods.

Charges for establishment and tools and plant.

P. W. D. Code, Vol. II, para. 1885 (V).

21. When the public works department executes work on
behalf of local funds, or undertakes contribution works for municipalities or other public bodies, it is open to the local Government
to reduce the usual percentage charges for establishment and tools
and plant, or to remit them altogether. It appears from the evi-
22(i). dence we have received that the establishment charges on contribution works are often remitted, while a fixed percentage, usually
considerably below the actual cost, is charged on works executed
on behalf of local funds. This system has two unsatisfactory
features. In the first place it entails charging against ordinary
provincial works a much higher percentage of establishment than
they should rightly bear. For example, during the three years
ending 1913-14, the percentage borne by the cost of establishment
to the cost of construction in the United Provinces was 20 per
cent. in the case of provincial, 13 per cent. in the case of local fund
and 2 per cent. in the case of contribution works, the average cost
of work done under each head being Rs. 51, 24 and 11 lakhs respectively. These percentages are wholly fictitious, that chargeable
against provincial revenues being unduly inflated to cover the
remissions made under other heads. In the second place this
procedure prejudices private enterprise, as no municipality or
public body is likely to invoke the services of a private firm so
long as government is willing to do the work at cost price without charging for supervision or plant. In the interests both of

good accounting and of private enterprise we recommend that the power of local Governments to remit or reduce departmental charges should be withdrawn and that these charges should invariably be levied at the average percentage obtaining on government works. Should the local Government desire to render assistance, it should take the form of a grant-in-aid without any accompanying restriction as to the agency by which the work is to be carried out. We deprecate the present system under which government may insist on executing, through the public works department, any work towards which it contributes a grant. Their functions should be limited to seeing that the grant contributed is not wasted. 47(i).

Percentage charges on stores.

22. In regard to government stores, it has been suggested that the rule which prohibits the sale of government stores unless a percentage charge of 10 per cent. is added to their value to cover the cost of supervision, storage and contingencies results in the accumulation of surplus stock and a consequent locking up of capital in that the sale price of the materials is usually above the price at which they can be purchased in the open market. This contention appears to us to be well-founded, and we recommend that, when stores are surplus and otherwise unsaleable, the officer empowered to sanction their sale should also be authorized to remit the percentage charge. 87(i). P. W. D. Code, Vol. I, para. 1222.

PRESENT AND PROPOSED POWERS OF PUBLIC WORKS DEPARTMENT OFFICERS.

Class of officer.	POWER TO ACCORD TECHNICAL SANCTION TO ESTIMATES.		POWER TO ACCEPT TENDERS.		POWER TO PURCHASE TOOLS AND PLANT.	
	Present.	Proposed.	Present.	Proposed.	Present.	Proposed.
Chief engineer	*Nil.*	Rs. 16,00,000, as now exercised by local Governments.	Rs. 16,00,000	*Nil.*	*Tools and Plant* . . *Nil* *Office furniture* . . Full *Live stock* . . . *Nil*	Full powers under all heads as now exercised by local Governments.
Superintending engineer	At the discretion of the local Government, subject to a maximum of Rs. 50,000.	Rs. 1,00,000	As for technical sanction .	Full powers	*Tools and Plant.*—At discretion of local Government subject to a maximum of Rs. 10,000. *Office furniture.*—At discretion of local Government subject to a maximum of Rs. 500. *Live stock* . . . *Nil*	*Tools and Plant* . Rs. 15,000 *Office furniture.* . Rs. 1,500 *Live stock* . . *Nil*
Executive engineer	At the discretion of the local Government, subject to a maximum of Rs. 2,500.	*Works designed on standard plans* . Rs. 25,000 *Other works* . . Rs. 15,000	Rs. 5,000	Rs. 1,00,000	*Tools and Plant.*—At discretion of local Government subject to a maximum of Rs. 500. *Office furniture* . *Nil* *Live stock* . . *Nil*	*Tools and Plant* . Rs. 2,000 *Office furniture* . Rs. 500 *Live stock* . . *Nil*
Assistant engineer or sub-engineer in charge of sub-division.	*Nil.*	*Works designed on standard plans* . Rs. 2,500 *Other works* . . Rs. 1,500	*Nil.*	Rs. 25,000	*Tools and Plant* . . *Nil* *Office furniture* . . *Nil* *Live stock* . . . *Nil*	*Tools and Plant, and stores forming part of a sanctioned estimate* Rs. 250 *Office furniture* . . *Nil* *Live stock* . . . *Nil*

These limits refer to expenditure on works only, exclusive of tools and plant and establishment charges.

APPENDIX C.

Memorandum from the Royal Institute of British Architects.

The Viceroy outlined a policy of decentralization in respect to the design and supervision of official buildings by which much of this work would be in charge of the District Boards instead of the Provincial Public Works Department.

The reference to the committee suggests that the matter has been visualized primarily from the administrative standpoint.

Now though this aspect is important it is by no means the only one to be taken account of. The assumption that the present highly centralized control of buildings does not give the best results may be unhesitatingly accepted. Those qualified to produce good designs are not able to see that they are properly carried out, while those entrusted with the latter duty, having many other classes of work to attend to, are not sufficiently experienced in buildings.

Apart from this there is another point namely that India is sadly in need of those capable of designing and constructing buildings. Except in a few favoured districts, where the craftsmen still maintain the old traditional methods of building, these traditions have lapsed and nothing of equal value has taken their place, nor even where the tradition is well maintained does it quite meet all the requirements of modern developments. It may therefore be affirmed that much of the building work, public and private, is deplorably bad.

The concentration of public work has discouraged many competent men from taking up building from the professional or the business aspect, and both municipalities and private individuals find the greatest difficulty in getting building works artistically and skilfully carried out.

It may be assumed that one of the objects of the proposed scheme is to provide that every district shall be provided with capable designers and skilled constructors, but it does not seem to be fully realized that a mere revision of administrative methods will be of little use without active measures for the provision of qualified men. Without these no advance can be made. Such a body does not exist at the moment, it would have to be imported or trained. We need not go into the question as to whether recruits to it would be mainly European or Indian. The European would probably be required at first on account of the small number of Indians that have qualified themselves for this work, but it must be remembered that while the Indian may require training in architecture and construction, the European requires training in Indian conditions.

The success of the Indian in Law and Medicine suggests that given the necessary incentive he would master the art of Architecture. That so few have done so in recent times is partly due to the fact that no suitable training is provided. Almost the only form of education open is on strictly European lines and these cut so sharply across the Indian conception of building that the student becomes confused and baffled. If this education could start from the knowledge possessed by the *Mistri* of Southern India and from that basis could be built up the wider knowledge demanded by modern requirements and materials we might expect to secure the best type of exponent of a genuinely Indian Architecture.

This procedure would naturally be only practicable in the case of one bred in India, and we must also consider the case of the European prepared to qualify for practice in the east. In his case he would probably have acquired his knowledge by means of the methods accepted here in England, and would need to supplement these by a sound study of Indian conditions and how these express themselves in building.

If his training had been on broad lines he should be capable of this adaptation, but some direction should be given him before-hand by one experienced in Indian requirements so as to save him time in his Indian career. In either case a bare mechanical knowledge of building can do nothing towards vitalizing methods of design in India.

Under any circumstances it would be desirable to strengthen the training in Architecture in the principal centres of India by the development of existing schools and the establishment of chairs of architecture in the Universities, with a curriculum including not only the scientific basis of structure but also the principles of design, for which illustrations may be drawn from the history of Indian art quite as profitably as from that of European countries.

Assuming that a number of well-qualified men were thus made available, it would only be fair that there should be some reasonable guarantee for their employment, and it may be suggested that this should be met by appointing them as consultants, etc., to District Boards and Municipalities with moderate retaining fees or other suitable methods of remuneration in return for services required by these authorities, but leaving them free to take up private work to an extent that did not interfere with their public duties.

The success of an administrative change such as this depends so largely on the means to be employed to meet its requirements from the technical point of view that a sound system of training, which cannot be said to exist at present, is an essential factor in the achievement of the results aimed at.

H. V. LANCHESTER,
for the Royal Institute
of British Architects.

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21. Contractors :
(i) Classification of — according to professional qualifications, financial status, etc., recommended, *Kamat*, 753 ; *Abhyankar*, 1162 (5), 1,172 ; *Kelkar*, 1,249 ; *Amar Nath Das*, 1,485, 1,500 ; *Venkatesar Aiyar*, 2,629 (*a*) (*b*), 2,639 ; *Verrieres*, 3,821 (3), 3,832 ; *Gavin Jones*, 4,054 ; *Lane Brown*, 4,198 ; *West*, 4,266 (1) (2) ; *Keeling*, 4,757.
(ii) Classification of — according to staff, with proportionate increase in rates, *Currie*, 4,673 ; *United Provinces Government*, 4, p. 308, Vol. III.
(iii) Government supervision will not be materially decreased by employment of large —, *Shoubridge*, 2, 14 ; *Framji*, 69 ; *Wittet*, 118 (7) ; *Sprott*, 165 ; *Hansoti*, 383 ; *Maughan*, 576 ; *Walker*, 1,125 ; *Zorab*, 1,781, 1,802 ; *Bannerjee* (*K. C.*), 1,913 ; *Banerjee* (*J. C.*), 1,985 ; *Srinivasa Aiyengar*, 2,141 (4), 2,183 ; *Fraser*, 2,454 ; *Chetty*, 2,468 ; *Parry*, 4,145 ; *Yeoman*, 4,631.
(iv) Majority of public works department works unattractive to large —, *Hansoti*, 350 (2) ; *Gill*, 429 (2) ; *Ormsby*, 740 ; *Thompson*, 840 ; *Abhyankar*, 1,162 (2) ; *Cowley*, 1,358 ; *Birley*, 1,829 ; *Martin*, 1,960 ; *Gopala Ayyar*, 2,355 ; *Nowroji* 2,527 (4) ; *Verrieres*, 3,819 (9) ; *Dorman*, 4,686 (5) ; *Government of Bengal*, 3, p. 343, Vol. II.
(v) Petty — tender at low rates in hope of increases later, *Dey*, 1,445 ; *Tillard*, 3,659 (2), 3,727.
PROPOSAL TO ENTRUST ALL WORKS WITHIN A SPECIFIED AREA TO A CONTRACTOR FOR A TERM OF YEARS :
(vi) Advocated, *Turner*, 479 ; *Godbole*, 599 (4), 611, 623 ; *Kamat*, 753 ; *Vacha*, 1,094 ; *Abhyankar*, 1,162 (4). (5), 1,172 ; *Kelkar*, 1,249 ; *Abbott*, 4,153 (2), 4,156-4,159.
(vii) Opposed, *Hansoti*, 350 (3) ; *Lalubhai Samaldas*, 789 ; *Mitra*, 1,316.
(viii) Should be allowed to supply all imported stores required for their work, *Srinivasa Aiyengar*, 2,141 (11).
(ix) Should be entrusted with works subject only to inspection of completed work, *Copleston*, 458, 475 ; *Vacha*, 1,094 ; *Abbott*, 4,162, 4,164, 4,174 ; *Lane Brown*, 4,214, 4,220 ; *Marris*, 4,303 (4).
See also Advances to contractors, Lump sum contracts, Piecework system.

D

22. Departmental charges :
(i) Reduced or remitted on contribution works, *Thomson*, 902 ; *Dey*, 1,478 ; *Lechmere-Oertel*, 1,677 ; *Mullings*, 2,549, 2,575 ; *Wollaston*, 2,668 ; *Petters*, 2,750 ; *Stanley*, 3.159 ; *Tillard*, 3,658, 3,684 ; *de la Fosse*, 3,880 ; *Campbell*, 3,924 ; *Dorman*, 4,685 (10) ; *Gamble*, 4,862, 4,887 ; *Government of Bombay*, (i) (6), p. 323, Vol. II.

23. Departmental labour :
(i) Extent of employment of — in Madras, *Lacey*, 2,078 (4) ; *Chetty*, 2,487.

24. Direction charges :

(i) Excessive, *Kelkar*, 1,219-20, 1224, 1,226-1,227, 1,240

25. Disciplinary powers :

(i) Compulsory retirement of inefficients recommended, *Somaldas*, 795 ; *Dey*, 1,470 ; *Amar Nath Das*, 1,516 ; *Tillard*, 3,720 ; *Keeling*, 4,817.

RESTRICTED — OF PUBLIC WORKS DEPARTMENT OFFICERS :

(ii) Detrimental to efficiency of department, *Pratt*, 705 ; *Thomson*, 871 ; *Mitra*, 1,324 ; *Cowley*, 1,396 ; *Srinavasa Aiyengar*, 2,167, 2,178 ; *Blaber*, 3,637 ; *Abbott*, 4,184.

(iii) Should be increased, *Stanley*, 3,143 ; *Tillard*, 3,698 ; *Verrieres*, 3,843 ; *Kanhaiya Lal*, 4,402 ; *Budh Singh*, 4,734 ; *Keeling*, 4,785.

(iv) Should not be increased, *Hansoti*, 399 ; *Lacey*, 2,108, 2,132 ; *Astbury*, 4,377.

26. District :

(i) Should be public works department unit of administration, *Biggwither*, 2,827 (2), 2,841 ; *Chief Commissioner, Central Provinces*, 14, p. 355, Vol. II.

27. District boards :

TRANSFER OF PUBLIC WORKS TO —

(i) Boards will welcome —, *Godbole*, 608 ; *Pratt*, 717 ; *Kamat*, 754 ; *Lalubhai Samaldas*, 778 ; *Muhammad Noor*, 3,595.

(ii) Boards will not welcome —, *Birley*, 1,856 ; *Paddison*, 2,271, 2,282 ; *Schmidt*, 2,322.

(iii) Proposals for transfer, *Framji*, 58 (5) ; *Godbole*, 599 (?), 608, 609 ; *Kamat*, 754 ; *Thomson*, 848 ; *Patuck*, 1,064 (1) ; *Vacha*, 1,083 (4) ; *Srinivasa Aiyengar*, 2,142, 2,160 ; *Stanley*, 3,122, *Morrison*, 3,402 ; *Maynard (F.)*, 3,433 ; *Oldham*, 3,462 ; *Beckett*, 3,519 ; *Muhammad Noor*, 3,595 ; *Tilard*, 3,660 (1), 3,686-3,687 ; *West*, 4,266 (5), 4,276 ; *Kanhaiya Lal*, 4,385 (16), 4,392 ; *Maynard (H. J.)*, 4,532, 4,555 ; *Kitchin*, 4,604 ; *Keeling*, 4,747 (4)-(5), 4,773 ; *United Provinces Government*, 4, 8 (ii) (3)-(5), pp. 308-309, Vol. III, *Punjab Government*, II, p. 312, Vol. III.

(iv) Transfer of provincial roads not advocated, *Kamat*, 754, 769 ; *Lalubhai Samaldas*, 772 ; *Abhyankar*, 1,180 ; *Mitra*, 1,300, 1,319, 1,321 ; *Tillard*, 3,686 ; *Hira Khan*, 4,025.

(v) Necessity for inspectors of works, *Hansoti*, 394 ; *Thomson*, 848 ; *Morrison*, 3,402 ; *Maynard (F.)*, 3,434, 3,436 ; *Oldham*, 3,467 ; *Muhammad Noor*, 3,598 ; *West*, 4,276 ; *Maynard (H. J.)*, 4,537.

(vi) Transfer recommended only if deputy commissioner is chairman of board : *Framji*, 81 ; *Birley*, 1,845 ; *Oldham*, 3,502 ; *Bengal Government*, 10, p. 344, Vol. II.

(vii) Proposed public works sub-committee, *Walker*, 1,153

FINANCIAL ARRANGEMENTS FOR TRANSFER :

(viii) Fixed annual grant should be given : *Birley*, 1,831 (1)

(ix) Impossibility of surcharging individual members, *Walker*, 1,152 ; *Damle*, 1,202 ; *Morrison*, 3,397.

(x) Surcharge of district funds advocated, *Maynard (H. J.)* 4,564

(xi) Surcharge of district funds unsatisfactory, *Damle*, 1,202 ; *Morrison*, 3,402.

See also District board engineering schemes, District board engineers, District board expenditure, District board staff, District board works.

(xii) Powers of Government over ——, *Oldham*, 3,463-3,465 ; *Maynard (H. J.)*, 4,565 (1)-(7).

28. District board engineering schemes :

(i) Bengal scheme of 1892, *Cowley*, 1,393, 1,404, 1,433 ; *Birley*, 1,833, 1,848, 1,868 ; *Bannerjee (K. C.)*, 1,922 ; *Maynard (H. J.)*, 4,512 ; *Bengal Government*, 10, page 344, Vol. II.

(ii) Central Provinces local fund engineering scheme, *Moss King*, 1,029-1,030 ; *Walker*, 1,123(5), (6) (ii) ; *Abhyankar*, 1,163(1)-(4) ; *Chief Commissioner, Central Provinces*, 8-10, p. 334, Vol. II ; *Central Provinces Administration*, Appendix V, p. 340-341, Vol. II.

28. District board engineering schemes —*contd.*

(iii) United Provinces scheme of 1882-1887, *United Provinces Government*, 4, p. 308, Vol. III.

29. District board engineers :

POWERS OF GOVERNMENT REGARDING APPOINTMENTS, EMOLUMENTS, ETC. :

(i) Existing powers, *Patuck*, 1,078 ; *Walker*, note ; *Abhyankar*, 1,176 ; *Damle*, 1,200 ; *Paddison*, 2,256-2,257 ; *Schmidt*, 2,309 ; *Stanley*, 3,119 ; *Oldham*, 3,462 ; *Maynard (H. J.)*, 4,565(4) ; *Bengal Government*, Annexure B, p. 348, Vol. II ; *Punjab Government*, III, p. 313, Vol. III.

(ii) Proposed powers, *Pratt*, 732 ; *Kamat*, 755 ; *Lalubhai Samaldas*, 778 ; *Patuck*, 1,068-1,069 ; *Vacha*, 1,109 ; *Walker*, 1,147 ; *Damle*, 1,202 ; *Kelkar*, 1,248 ; *Morrison*, 3,402 ; *Keeling*, 4,747(2).

(iii) Difficulty of obtaining suitable staff, *Paddison*, 2,248 ; *Astbury*, 4,347, 4,379 ; *Maynard (H. J.)*, 4,506 ; *Kitchin*, 4,608.

(iv) Inferior qualifications of majority of —, *Dey*, 1,439(10) ; *Hutton*, 2,198(2) ; *Maynard (H. J.)*, 4,506 ; *Kitchin*, 4,604, 4,608 ; *Budh Singh*, 4,722(4).

(v) Provincial cadre of — recommended, *Godbole*, 616, 624, 633 ; *Pratt*, 722 ; *Vacha*, 1,111 ; *Walker*, 1,145 ; *Damle*, 1,207 ; *Mitra*, 1,320 ; *Cowley*, 1,413 ; *Temple*, 3,215, 3,234, 3,249-3,250 ; *Maynard (F.)*, 3,435 ; *Kanhaiya Lal*, 4,385(6), 4,395 ; *Maynard (H. J.)*, 4,514, 4,535 ; *Punjab Government*, III, p. 313, Vol. III.

(vi) Separate allowances given to — for undertaking government work in Bengal and Bihar and Orissa, *Cowley*, 1,404 ; *Stanley*, 3,121 ; *Bishun Swarup*, 3,206 ; *Temple*, 3,231 ; *Morrison*, 3,401 ; *Maynard (F.)*, 3,430 ; *Oldham*, 3,460 ; *Blaber*, 3,613 (14).

30. District board expenditure :

(i) Insufficient to permit of employment of competent staff, *Turner*, 490 ; *Godbole*, 610 ; *Dube*, 930(7) ; *Walker*, 1,123(4) *Lechmere-Oertel*, 1,676 ; *Kitchin*, 4,616 ; *Chief Commissioner, Central Provinces*, 8, p. 334, Vol. II.

31. District board staff :

(i) Burma. Absence of district boards, *Wollaston*, 2,663 ; *Martindell*, 2,726 ; *Thompson*, 2,798.

(ii) Establishment entertained in the various provinces, *Framji*, 77 ; *Hansoti*, 386 ; *Godbole*, 608, 630 ; *Pratt*, 731 ; *Thomson*, 821(7), 847 ; *Cowley*, 1,392 ; *Lechmere-Oertel*, 1,651 ; *Lacey*, 2,090 ; *Paddison*, 2,255 ; *Stanley*, 3,118 ; *Tillard*, 3,685 ; *Maynard (H. J.)*, 4,505 ; *Bombay Government*, (ii) (5), p. 325, Vol. II, *Central Provinces Administration*, Annexure B to Appendix V, p. 342, Vol. II, *Bengal Government*, 10 and Annexure B, pp. 344 and 348-349, Vol. II, *Bihar and Orissa Government*, 5, page 305, Vol. III.

32. District board works :

(i) Absence of control by superior supervising staff, *Thomson*, 905 ; *Macmichael*, 2,367 ; *Kitchin*, 4,604 ; *Yeoman*, 4,621(3) *Dorman*, 4,698 ; *Budh Singh*, 4,722(4), 4,733.

(ii) Inadequacy of supervision exercised over — by inspectors of works, *Thomson*, 905 ; *Macmichael*, 2,367 ; *Bishun Swarup*, 3,215 ; *Temple*, 3,235.

(iii) Proposal to transfer all — to the public works department, *Dube*, 939 ; *Walker*, 1,123(8), 1,137, 1,140-1,141 ; *Lacey*, 2,092 ; *Dorman*, 4,686(12), 4,698 ; *Budh Singh*, 4,722(10), 4,733.

33. District officer :

EXECUTIVE ENGINEER SHOULD BE ASSISTANT TO —

(i) Advocated, *Copleston*, 448(7) (8), 457, 463.

(ii) Opposed, *Thomson*, 861, 889 ; *Walker* 1,123(9) ; *Hardiman* 3,038(4).

(iii) Executive engineer should submit diary through —, *Turner*, 481, 492, 495.

34. Duplication of staff :

(i) Extravagance of, *Thomson*, 821(8), Note (*a*) ; *Patuck*, 1,070 ; *Walker* 1,123(8) ; *Abhyankar*, 1,164(8) ; *Birley*, 1,830 ; *Schmidt*, 2,299 ; *Venkatesa Aiyar*, 2,636(i) ; *Kanhaiya Lal*, 4,382(2) ; *Maynard (H. J.)*, 4,502 ; *Narain Singh*, 4,569(3) ; *Kitchin*, 4,603 ; *Chief Commissioner, Central Provinces*, 12, p. 335, Vol. I.

E

35. Electrical Adviser to the Government of India :
- (i) Duties of —, *Meares* . 1,727(2), 1,737, 1760
- (ii) Importance of functions of — as chairman of electrical conference, *Meares*, 1,735, 1,754 ; *Bell*, 4,264.
- (iii) Value of counsel in dealing with commercial undertakings, *Meares* . . 1,724, 1,727(3)
- (iv) Debarred from visiting Bombay, *Meares* . 1,739
- (v) Appointment not justified from standpoint of local Governments, *McIntyre*, 3,567 ; *Bell*, 4,244.

36. Electrical engineer :
- (i) Bombay, Duties of —, *Stuart Menteth* . 193
- (ii) Bengal. Duties of executive engineer, electrical division, *Taylor* . . 1,571(1), 1,577, 1,578

37. Electrical works :
- (i) Departmental work advocated for —, *Stuart Menteth*, 186 ; *Taylor*, 1,600 ; *Bell*, 4,235(2), 4,238.
- (ii) Departmental work advocated for repairs only, *Raikes*, 2,775 ; *McIntyre*, 3,560 ; *Eastgate*, 4,463(4)-(5), 4,476.
- (iii) Executed by contract, *Taylor*, 1,578-1,579 ; *Greenwood*, 2,224(1) ; *McIntyre*, 3,555 ; *Eastgate*, 4,463(1) (3), 4,475.

38. Electricity Act :
- (i) Decentralization effected by —, *Meares* . 1,726

39. Engineering Colleges :

AGE LIMIT AT ENTRANCE :
- (i) Present age limit suitable, *Framji*, 87 ; *Allen*, 234 ; *Kamat*, 757 ; *James*, 2,610.
- (ii) Present age limit too high, *Sprott*, 166 ; *Dawson*, 270(4) ; *Messent*, 579(2), 588 ; *Heaton*, 1,886 ; *Lacey*, 2,128 ; *de la Fosse*, 3,896 ; *Wood*, 4,098(2), 4,110 ; *Chatterton*, 4,891(6), 4,897, 4,916.

EDUCATIONAL QUALIFICATION :
- (iii) Intermediate standard advocated, *Lacey*, 2,128 ; *James*, 2,611 ; *Tipple*, 3,794 ; *de la Fosse*, 3,897 ; *Budh Singh*, 4,738 ; 4,741, 4,743.
- (iv) Matriculation standard advocated, *Dawson*, 270(5), 277 ; *Nowroji*, 2,540.
- (v) Elimination of subordinate education from — recommended, *Chatterton*, 4,891(4), 4,898 ; *United Provinces Government*, 8(vii) (2), p. 310, Vol. III, *Punjab Government*, VII, p. 314, Vol. III.
- (vi) Limitations on numbers entering should be removed, *Framji*, 63(3), 90 ; *Vacha*, 1,088; *Hira Khan*, 4,017(3).
- (vii) Staff. Larger proportion should be recruited from the public works department, *Vacha*, 1,095 ; *Abhyankar*, 1,167 ; *Gopala Ayyar*, 2,333(6), 2,343 ; *Nowroji*, 2,541 ; *James*, 2,622 ; *Hira Khan*, 4,017(2); *Chatterton*, 4,904.

See also Engineering degree, Engineering education, Roorkee College, Scholarships, Sibpur College, Technical Schools.

40. Engineering degree :
- (i) Should qualify for admission to other services, *Hansoti*, 398 ; *Srinivasa Aiyengar*, 2,172 ; *Spring*, 2,411.
- (ii) Should not in itself so qualify, *Turner* . 483, 493

41. Engineering education :
- (i) Importance of mechanical engineering not sufficiently recognized, *Chatterton* . 4,894-4895, 4,913

THEORETICAL STANDARD :
- (ii) Sufficiently high, *Shoubridge*, 7 : *Framji*, 63(3), 86 ; *Sprott*, 155 ; *Stuart Menteth*, 202 ; *Allen*, 217 ; *Dawson*, 270(2) ; *Hansoti*, 354 ; *Messent*, 579(2) ; *Mawson*, 678 ; *Ormsby*, 739 ; *Kamat*, 748, 757 ; *Lalubhai Samaldas*, 775 ; *Dube*, 945 ; *Desmond*, 996 ; *Abhyankar*, 1,167 ; *Amar Nath Das*, 1,501 ; *Taylor*, 1,589 ; *Williams* (*G. B.*), 1,621 ; *Lechmere-Oertel*, 1,665, 1,695 ; *Meares*, 1,753 ; *Zorab*, 1,771, 1,784 ; *Lacey*, 2,083 ; *Hutton*, 2,196 ; *Maynard* (*F.*), 3,423 ; *Beckett*, 3,509 ; *Blaber*, 3,618 ; *Verrieres*, 3,819(11) ; *Wood*, 4,100(1) (2), Annex. I (1) (viii) ; *Lane Brown*, 4,191 ; *Budh Singh*, 4,727(5) ; *Bombay Government*, (vii) (2), p. 327, Vol. II.

41. Engineering education—*contd.*

THEORETICAL STANDARD—*contd.*
- (iii) Too high for subordinates, *Shoubridge*, 7 ; *Framij*, 86 ; *Sprott*, 170 ; *Gebbie*, 411 ; *Mackison*, 557 ; *Messent*, 587 ; *Godbole*, 629 ; *Thomson*, 876 ; *Mitra*, 1,301(4) ; *Cowley*, 1,399 ; *Mullings*, 2,554 ; *James*, 2,615 ; *Bishun Swarup*, 3,197 ; *Blaber*, 3,638 ; *Chatterton*, 4,819(5).

PRACTICAL STANDARD :
- (iv) Lack of knowledge of practical machinery, *Thomson* ; 891, 924 ; *Mullings*, 2,554 ; *Kanhaiya Lal*, 4,389(2).
- (v) Passed students show lack of practical ability, *Stuart Menteth*, 190, 202 ; *Dawson*, 270(2) ; *Gill*, 430, 434 ; *Mackison*, 524(1) ; *Mawson*, 678 ; *Ormsby*, 734, 739 ; *Kamat*, 757 ; *Amar Nath Das*, 1,501 ; *Taylor*, 1,589 ; *Paddison*, 2,253 ; *Spring*, 2,411 ; *Hira Khan*, 4,028 ; *Eastgate*, 4,467(1). *See also* Specialization in colleges.

42. Estimating :
- (i) Low standard of — in India, *Lishman*, 3,980 ; *Dorman*, 4,687(2) ; *Keeling*, 4,780.

F

43. Famine relief :
- (i) District board staff could be entrusted with, *Thomson*, 853 ; *Walker*, 1,146 ; *Campbell*, 3,926 ; *United Provinces Government*, (iii) (8), p. 309, Vol. III.
- (ii) Already theoretically duty of district board, *Campbell* 3,926
- (iii) Importance of public works department as agency for, *Desmond*, 968(3) ; *Mitra*, 1,301(3) ; *Verrieres*, 3,828 ; *Bombay Government*, (ii) (6), p. 325, Vol. II.

44. Financial year :

DISADVANTAGES OF DATE OF CLOSING —.
- (i) Allotments unknown till April at earliest, *Moss King*, 1,039(i) ; *Mullings*, 2,562(*b*).
- (ii) Falls in middle of working season, *Thomson*, 918 ; *Milne*, 1,281 ; *Mitra*, 1,299(5); *Dey*, 1,442(3); *Lechmere-Oertel*, 1,660(i) (*c*), 1,687 ; *Mullings*, 2,564 ; *Thompson*, 2,790(3), 2,811 ; *Verrieres*, 3,825 ; *Chief Commissioner, Central Provinces*, 21, p. 336, Vol. II ; *United Provinces Government*, 8(vi) (2), p. 310, Vol. III.

45. Foremen :
- (i) Importation of European — advocated, *Raikes*, 2,764, 2,778 ; *Pullar*, 2,867 ; *Foster*, 2,915, 2,916(1) (*f*) ; *Morris*, 3,098 ; *Munnings*, 3,272, 3,289 ; *Walford*, 3,327 ; *Lishman*, 4,953 ; *Sullivan*, 4,426, 4,439 ; *Punjab Government*, IV(b), p. 314, Vol. III.

G

46. Government work :
- (i) Proportion of — to private work in Calcutta and Madras, *Crouch*, 1,546 ; *Lacey*, 2,117 ; *Fraser*, 2,454 ; *Pears*, 2,507.

47. Grant-in-aid :
- (i) Government executes work for which it gives —, *Shoubridge* 23

48. Guaranteed appointments :
- (i) Practical examination for — at Sibpur, *Cowley*, 1,402 ; *Heaton*, 1,891 ; *Walford*, 3,321.

I

49. Indian engineers :
- (i) Early environment disadvantageous to practical work, *Lechmere-Oertel*, 1,664 ; *Wood*, 4,086 ; *Chatterton*, 4,896.

50. Insein school of engineering :

See Technical Schools.

51. Irrigation branch :
(i) Degree of separation from buildings and roads branch, *Shoubridge*, 16 ; *Gebbie*, 406 ; *Thomson*, 828 ; *Cowley*, 1,368 ; *Amar Nath Das*, 1,508 ; *Lacey*, 2,078(1), 2,085 ; *Wollaston*, 2,660 ; *Stanley*, 3,111 ; *Tillard*, 3,666 ; *Astbury*, 4,329 ; *Madras Government*, 3, p. 351, Vol. II.
(ii) Should take over buildings and roads work in irrigated areas, *Kelkar*, 1,231 ; *Kitchin*, 4,603, 4,607.

52. Isolation of public works department :
(i) Complaints regarding, *Coplesston*, 448(10), 473 ; *Moss King*, 1,039(10), 1,052 ; *Patuck*, 1,073 ; *Walker*, 1,129 ; *Biggwither*, 2,822(17) (*a*)-(*d*), 2,841 ; *Chief Commissioner, Central Provinces*, 5(*a*), p. 333, Vol. II.

L

53. Lower subordinates :
(i) Distinction between — and upper subordinates should be abolished, *Gebbie*, 403(1), 413 ; *Lacey*, 2,079(2) ; *Temple*, 3,214(2), 3,238 ; *Astbury*, 4,372.
(ii) Minimum pay inadequate, *Dube*, 932(2) ; *Vacha*, 1,092 ; *Maung Ba*, 2,989 ; *Temple*, 3,246 ; *Blaber*, 3,618(3) ; *Verrieres*, 3,860 ; *Hira Khan*, 4,033 ; *Astbury*, 4,372 ; *Kanhaiya Lal*, 4,385(9), 4,404 ; *Keeling*, 4,791.
(iii) Placed in subdivisional charge, *Thomson*, 881 ; *Vacha*, 1,092 ; *Dey*, 1,458.
(iv) Should not be trained in major engineering colleges, *Heaton*, 1,895 ; *Venkatesa Aiyar*, 2,634(3) ; *Tipple*, 3,784 ; *Wood*, 4,114.

54. Lump sum contracts :
(i) Advocated, *Crouch*, 1,535 ; *Lechmere-Oertel*, 1,714 ; *Gavin Jones*, 4,053.

M

55. Material. Supply of —
(i) By contractors should be encouraged, *Thomson*, 821(6) ; *Bannerjee* (*J. C.*), 1,984 ; *Chetty*, 2,476 ; *Keeling* 4,759-4,760.
By Government :
(ii) Disadvantageous to private enterprise, *Martin*, 1,952, 1,968 ; *Maung Ba*, 2,984 ; *Shaw*, 3,374 ; *Williams* (*W. H.*), 3,533.
Advantages of —.
(iii) Lower rates, *Cowley*, 1,352(i) (ii), 1,410 ; *Petters*, 2,748.
(iv) Maintenance of reserve, *Cowley*, 1,430 ; *Zorab*, 1,766, 1,776, 1,799 ; *Bannerjee* (*J. C.*), 1,984.
(v) Prevents fluctuations in price, *Cowley*, 1,410 ; *Lacey*, 2,097 ; *Petters*, 2,748.
(vi) Quality according to specification, *Shoubridge*, 41 ; *Mackison*, 531 ; *Cowley*, 1,371 ; *Zorab*, 1,776 ; *Bannerjee* (*K. C.*), 1,920 ; *Petters*, 2,748.

56. Matriculation examination :
(i) Low standard of education connoted by —, *Allen*, 235, 260 ; *Godbole*, 614.

57. Mechanical engineers :
(i) Employment of — by government advocated, *Williams* (*G. B.*), 1,636 ; *Bell*, 4,236 ; *West*, 4,269(6), 4,284 ; *Astbury*, 4,330 ; *Dorman*, 4,687(1).

58. Military origin of public works department :
(i) Traces exist in present methods, *Lechmere-Oertel* 1,679

59. Minor irrigation establishment, Madras :
(i) Employed under collector, *Lacey*, 2,086 ; *Paddison*, 2,274 ; *Schmidt*, 2,320 ; *Macmichael*, 2,364, 2,366.

60. Minor irrigation works, Madras :
(i) Transfer of — to district boards recommended, *Srinivasa Aiyengar*, 2,142 ; *Schmidt*, 2,318 ; *Gopala Ayyar*, 2,333(8) note ; *Keeling*, 4,770.

61. Minor Works :
(i) Limit of — should be raised, *Thomson*, 869 ; *Moss King*, 1,039(2), 1,047.

62. Mistris :
(i) Further education of — desirable, *Willet*, 151 ; *Dawson*, 270(8) ; *Mackison*, 524(2), 557 ; *Desmond*, 1,008 ; *Dey*, 1,463 ; *Harper*, 2,007 ; *Srinivasa Aiyengar*, 2,174 ; *Gopala Ayyar*, 2,337 ; *Spring*, 2,411 ; *Kanhaiya Lal*, 4,389(6), 4,399.
(ii) Passed students sometimes have to rely on practical experience of their clients —, *Mackison*, 524(i). 540, 555.
Proposal to recruit subordinates from ranks of —.
(iii) Advocated, *Wittet*, 117(9), 138 ; *Mackison*, 530, 557 ; *Thomson*, 877 ; *Vacha*, 1,100 ; *Mitra*, 1,301(4), 1,312, 1,332 ; *Dey*, 1,461 ; *Srinivasa, Aiyengar*, 2,174 ; *Bishun Swarup*, 3,199, 3,211 ; *Tillard*, 3,702 ; *Lishman*, 3,982 ; *Kanhaiya Lal*, 4,385(10), 4,399 ; *Keeling*, 4,792.
(iv) Opposed, *Hansoti*, 380 ; *Godbole*, 612 ; *Dube*, 966 ; *Desmond*, 999 ; *Zorab*, 1,784, 1,790 ; *Blaber*, 3,638 ; *Hira Khan*, 4,032.

63. Municipalities :
(i) Combination of small — for purpose of employment of trained staff advocated, *Chambers*, 637, 651 ; *Pratt*, 722.
(ii) Establishment employed by —, *Shoubridge*, 23 ; *Wittet*, 132 ; *Hansoti*, 362 ; *Turner*, 487 ; *Mackison* 562 ; *Pratt*, 716 ; *Kamat*, 754 ; *Thomson*, 845 ; *Kelkar*, 1,252 ; *Paddison*, 2,248(2), 2,273 ; *Wollaston*, 2,663 ; *Thompson*, 2,796 ; *DuBern*, 2,882 ; *Oldham*, 3,457 ; *Parry*, 4,138 ; *Maynard* (*H. J.*), 4,504 ; *Bombay Government*, (ii) (4), p. 324 ; Vol. II.

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64. Patna school of engineering :
See Technical schools.

65. Payments on account :
Proposal to permit —.
(i) For materials, *Srinivasa Aiyengar*, 2,145(2) ; *Mullings*, 2,566, 2,580 ; *Dukoff Gordon*, 3,021 ; *Shaw*, 3,385 ; *Gamble*, 4,858(3).
(ii) For work, *Tomkins*, 2,071 ; *Blaber*, 3,653 ; *Gamble*, 4,882.

66. Peripatetic audit :
(i) System of — advocated, *Stuart Menteth*, 189(2), 200 ; *Thomson*, 879 ; *Milne* and *Stevenson*, 1,285, 1,290.
(ii) Would not lead to saving of work, *Swetenham*, 334, 335, 337, 339 ; *Tomkins*, 2,057 ; *Gamble*, 4,856, 4,876, 4,888.

67. Piecework system :
Arguments in favour of —.
(i) Absence of large contractors, *Stuart Menteth*, 194 ; *Thomson*, 821(4), 830 ; *Mitra*, 1,300(3) ; *Dey*, 1,477 ; *Amar Nath Das*, 1,484(4), 1,497 ; *Lacey*, 2,078(2), 2,125 ; *Spring*, 2,409(1) ; *Pears*, 2,508 ; *Martindell*, 2,724 ; *Petters*, 2,738 ; *Stanley*, 3,129 ; *Tillard*, 3,659 ; *Bombay Government*, (i) (3), p. 323, Vol. II ; *Madras Government*, 6, p. 352, Vol. II ; *Bihar and Orissa Government*, 3, p. 305, Vol. III ; *Punjab Government*, 11, p. 312, Vol. III.
(ii) Contractors usually middlemen employing pieceworkers, *Shoubridge*, 2(11) ; *Ormsby*, 737 ; *Thomson*, 821(5) ; *Zorab*, 1,775 ; *Bannerjee* (*K. C.*), 1,937 ; *Srinivasa Aiyengar*, 2,141(5) ; *Blaber* 3,613(3) ; *Verrieres*, 3,820(4) ; *Parry*, 4,145 ; *West* 4,266 ; *Narain Singh*, 4,573, 4,574.
(iii) Easier to make contractor demolish bad work or remove faulty materials, *Shoubridge*, 2 ; *Pears*, 2,489 (1).
(iv) Power to terminate agreement at any time, *Spring* 2,409 (2)
(v) Risk of litigation avoided, *Shoubridge* 2 (2) ; *Spring*, 2,416 ; *Pears*, 2,489 (1) ; *Blaber*, 3,613 (7).

68. Powers of public works department officers :
See Contracts, Disciplinary powers, Technical sanction, Tools and plant.

69. Practical training of students :
(i) Appointment of special officer to superintend—advocated, *Keeling*, 4,752, 4,796 ; *Bombay Government*, (viii) (2), p. 328, Vol. II ; *United Provinces Government*, (viii) (8), p. 310, Vol. III.
(ii) Importance of ——, *Shoubridge*, 33 ; *Sprott*, 155 (1) 179 ; *Allen*, 230 ; *Dawson*, 270 (3) ; *Mackison*, 524 (1) ; *Messent*, 579 (1) ; *Chambers*, 650 ; *Kamat*, 749, 757 ; *Lacey*, 2,083 ; *Maynard (F.)*, 3,423 ; *Lishman*, Annexure ; *Wood*, 4,099 ; Annexure II ; *Lane Brown*, 4,191 ; *Hewlett*, 4,586 ; *Yeoman*, 4,625 (2) ; *Bombay Government*, (viii) (6) ; p. 328, Vol. II.
(iii) Government officers should receive fees for undertaking —, *Dube*, 961 ; *Martindell*, 2,720, 2,730 ; *Wood*, 4,099; Addendum to Annexure II; *Yeoman*, 4,636 ; *Bombay Government*, (viii) (8), p. 328, Vol. II ; *Punjab Government*, VIII, p. 314, Vol. III.
(iv) Preliminary workshop training advocated, *Stuart Menteth* 191 (1), 202-203.
PROPOSAL TO GRANT STIPENDS TO STUDENTS UNDERGOING —
(v) Advocated, *Sprott*, 171 ; *Allen*, 249 ; *Hansoti*, 372 ; *Mackison*, 536 ; *Godbole*, 613 ; *Mawson*, 679 ; *Lalubhai Samaldas*, 793 ; *Advani*, 813 ; *Desmond*, 998 ; *Abhyankar*, 1,181 ; *Lechmere-Oertel*, 1,695 ; *Morris*, 3,095 ; *Tipple*, 3,790 ; *Lane Brown*, 4,191 ; (2); *West*, 4,302; *Keeling*, 4,797; *Bombay Government*, (viii) (8), p. 328, Vol. II.
(vi) Unnecessary, *Gebbie*, 417; *Kamat*, 757; *Vacha*, 1,097; *Budh Singh*, 4,739.
(vii) Premium system advocated *Shoubridge*, 34, 51 ; *Chambers*, 650 ; *Preston*, 688, 695 ; *Dube*, 961 ; *Mitra*, 1,330 ; *Martindell*, 2,720, 2,730 ; *Yeoman*, 4,636.
(viii) Paid apprenticeships advocated, *Stuart Menteth*, 191 (2); *Dawson*, 282.
SANDWICH SYSTEM:
(ix) Advocated, *Ormsby*, 739, 741 ; *Harper*, 2,006 ; *Chatterton*, 4,891 (2).
(x) Difficulties in way of introduction of —, *Sprott*, 173 ; *Allen*, 245 ; *Godbole*, 615.
(xi) Should be recognised as necessary qualification for degree, *Keeling* . . . 4,811
(xii) Already so recognised in Madras, *James* 2,620
(xiii) Possibility that other universities may refuse, *Sprott*, 168 ; *Allen*, 248-249 ; *Messent*, 587 ; *Bombay Government*, (viii) (7), p. 328, Vol. I.

70. Preaudit :
(i) Introduction of system of — advocated, *Vacha*, 1,101 ; *Keeling*, 4,789.

71. Private practice :
(i) Should be permitted without special sanction, *Stuart Menteth*, 211 ; *Meares*, 1,733 (2).
(ii) Not recommended, *Framji*, 100 ; *Mitra*, 1,344 ; *Lishman*, 3,964 ; *Sullivan*, 4,443.

72. Profit and loss account :
(i) Not kept of quasi-commercial undertakings, *Cowley*, 1,380, 1,414 ; *Martin*, 1,952 ; *Srinivasa Ayyar*, 2,390, 2,395 ; *Pullar*, 2,873 ; *Dukoff Gordon*, 3,022 ; *Gamble*, 4,860, 4,885.

73. Promotion of public works department officers :
(i) Committee to regulate — recommended, *Dorman*, 4,718.
(ii) Seniority more regarded than efficiency, *Thomson*, 823 (1), 859, 884, 888 ; *Dube*, 960 ; *Meares*, 1,718 ; *Wollaston*, 2,700 ; *DuBern*, 2,889 ; *Stanley*, 3,145 ; *Oldham*, 3,484 ; *Blaber*, 3,641 ; *Tillard*, 3,729 ; *Gavin Jones*, 4,043, 4,051 ; *Dorman*, 4,687 (2), 4,700.

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74. Quantity surveyors :
(i) Importation of European — advocated, *Foster*, 2,916 (1) (*d*), 2,937 ; *Lishman*, 3,948, 3,980 ; *Sullivan*, 4,435.

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75. Reappropriations :
(i) Powers of public works department officers to sanction — too extensive, *Walker* . . 1,150, 1,159
(ii) Public works department should be final authority regarding —, *Mitra*, 1,303 (1) ; *Keeling*, 4,750 (3), 4,786 ; *Chief Commissioner, Delhi*, 11, p. 316, Vol. III.

76. Repairs :
ANNUAL ESTIMATES OF —.
(i) Based on standard measurement books, *Desmond*, 990 ; *Dey*, 1,456 ; *Srinivasa Aiyengar*, 2,169 ; *Verrieres*, 3,849 ; *Astbury*, 4,333 ; *Dorman*, 4,685 (7).
(ii) Prepared before extent of repairs known, *Stanley*, 3,138 ; *Tillard*, 3,692 ; *Verrieres*, 3,849 ; *Hira Khan*, 4,036 ; *Bombay Government*, (v) (13), p. 326, Vol. II. *United Provinces Government*, 8 (vi) (4), p. 310, Vol. III.
(iii) Unnecessary, *Framji*, 72 ; *Swetenham*, 329 ; *Hansoti*, 369 ; *Tomkins*, 2,046 ; *Srinivasa Aiyengar*, 2,169 ; *Stanley*, 3,138 ; *Bishan Swarup*, 3,188 ; *Tillard*, 3,663 (4) ; *Verrieres*, 3,841 ; *Hira Khan*, 4,036 ; *Astbury*, 4,333.
DEFINITION OF —.
(iv) Unnecessarily restrictive, *Moss King*, 1,023 ; *Lechmere-Oertel*, 1,681 ; *Hira Khan*, 4,014.
(v) Case of Sylhet church, *Lechmere-Oerterl*, 1,681.

77. Roads :
(i) System of maintenance in various provinces, *Framji*, 82 ; *Hansoti*, 363 ; *Turner*, 489 ; *Pratt*, 719 ; *Abhyankar*, 1,163 (3), *Cowley*, 1393-1394 ; *Dey*, 1,452 ; *Lechmere-Oertel*, 1692 ; *Birley*, 1832 ; *Paddison*, 2,248 (2), 2,267 ; *Oldham*, 3,459 ; *Tillard*, 3,685 ; *Maynard (H. J.)*, 4,532.
(ii) Burma. Road cess administered by deputy commissioner through public works department. *Thompson* 2,797, 2,799
(iii) Madras. Present system works satisfactorily, *Paddison*, 2,248 (2) (3), 2,268 ; *Macmichael*, 2,362.

78. Roorkee College :
AFFILIATION WITH UNIVERSITY:
(i) Advocated, *Tipple*, 3,758, 3,780-3,782, 3,802, 3,811 ; *de la Fosse*, 3,875 (2), 3,898.
(ii) Opposed, *Wood* 4,110
(iii) Formation of faculty in 1893, *Tipple* 3,756, 3,809, 3,816.
(iv) Board of studies. Recognition of — advocated, *Tipple*, 3,777 ; *de la Fosse*, 3,895.
(v) Curriculum. Proposal to reduce courses in estimating and surveying, *Tipple*, 3,772, 3,785, 3,786, 3,814.
(vi) Should be under Education department, *Tipple*, 3,758, 3,779
See also Engineering colleges.

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79. Sanitary Engineers :
(i) Appointed without previous specialist experience, *Shoubridge*, 17, 42, 46 ; *Maughan*, 573 ; *Thomson*, 857 ; *DuBern*, 2,888 ; *Gavin Jones*, 4,049 ; *Lane Brown*, 4,189 ; *Astbury*, 4,328.
(ii) Importance of previous Indian experience, *Shoubridge*, 53 ; *Wood*, 4,107.
(iii) Knowledge of sanitary engineering more important than previous Indian experience, *Williams (G. B.)*, 1,651 ; *Tillard*, 3,668 ; *Gavin Jones*, 4,050 ; *Parry*, 4,137 ; *Lane Brown*, 4,206 ; *United Provinces Government*, 8 (iii) (5), p. 309, Vol. III.
(iv) Formation of separate branch for — advocated, *Shoubridge*, 18, 53 ; *Lacey*, 2,105 ; *Hutton*, 2,194 (1), 2,204 ; *Tillard*, 3,668 ; *Verrieres*, 3,822 (3), 3,837 ; *Bell*, 4,236 ; *West*, 4,269, 4,279.
(v) Maintain staff for supervision of the execution of sanitary works, *Shoubridge*, 17, 19 ; *Williams (G. B.)*, 1,611, 1,613, 1,627 ; *Petters*, 2,750 ; *Stanley*, 3,114 ; *Temple*, 3,223 ; *Tillard*, 3,668 ; *Astbury*, 4,353 ; *Punjab Government*, IV (*b*), p. 313, Vol. III.

79. Sanitary Engineers—*contd.*
(vi) Maintenance by — of staff for the execution of sanitary works advocated, *Shoubridge*, 19; *Williams* (*G. B.*), 1,633; *Hutton*, 2,194, 2,204; *Temple*, 3,217, 3,224; *West*, 4,280; *Budh Singh*. 4,724 (3).
(vii) Bengal and Bihar and Orissa. Not subordinate to Chief Engineer, *Cowley*, 1,370; *Williams* (*G. B.*). 1,619, *Stanley*. 3,108 (2), 3,113.

80. Sanitary Works :
(i) Absence of specialist firms, *Shoubridge*. 20, 55; *Lacey*, 2,014; *Hutton*, 2,202; *Nowroji*, 2.539; *Petters*, 2,751.
(ii) Contract system suitable for —, *Hutton*, 2,192 (2); *Nowroji*, 2,527 (6), 2,533, 2,535; *Lane Brown*, 4,204; *Hewlett*, 4,592.
(iii) Executed by contract, *Patuck*, 1,064 (6); *Williams* (*G. B.*), 1,614, 1,629-1630; *Lechmere-Oertel*, 1,659, 1,673; *Temple*, 3,225; *Lane Brown*, Annexure B.

81. Scholarships :
(i) Large expenditure on — at Sibpur college. *Heaton*, 1885 (iv)

82. School of architecture :
(i) Proposed — in Bombay, *Wittet*. 122 (3); *Allen*. 224; *Begg*, 4,837.

83. Sibpur College :
(i) High age limit at —, *Heaton* 1,886
See also Engineering colleges.

84. Specialist officers :
(i) Diverse and unfavourable terms granted to —, *Wittet*, 129; *Stuart Menteth*, 192 (1), 204; *Taylor*, 1,572 (1) (2) (4); *Meares*, 1,730-1,731, 1,746-1,747; *Greenwood*, 2,225 (3)-(5); *Sullivan*, 4,445-4,446, 4,458; *Eastgate*, 4,468 (i): *Begg*, 4,826.
(ii) Employment of — by government unnecessary, *Patuck*, 1,064 (5); *Mitra*, 1,302, 1,327; *Venkatesa Aiyar*, 2,631; *Beckett*, 3,506 (2), 3,520.
(iii) Employment of — in bridge building advocated, *Wittet*, 120; *Thomson*, 858, 921.

85. Specialization in colleges :
FURTHER—
(i) Advocated, *Framji*, 63 (4), 92, 106; *Advani*, 802 (i); *Lechmere-Oertel*, 1,710; *Bannerjee* (*J. C.*), 1,990; *Yeoman*, 4,625 (i).
(ii) Unnecessary, *Allen*. 244, 261; *James*, 2,602 (6), 2,621; *Tipple*, 3,797.
(iii) Should commence after graduation, *Allen*, 261; *Vacha*, 1,088 (7); *James*, 2,602 (7), 2,621.

86. Specialization in public works department :
(i) Further — advocated, *Sprott*, 157 (1) (2); *Maughan*, 565; *Mawson*, 685; *Srinivasa Aiyengar*, 2,143; *Morris*, 3,089 (4); *Gavin Jones*, 4,040-4,041, 4,049; *Sullivan*, 4,447; *Maynard* (*H. J.*), 4,499-4,500; *Punjab Government*, IV (*b*), p. 314, Vol. III.

87. Stores :
(i) Rule prescribing percentage to value of stores sold too rigid, *Keeling* 4,808

88. Stores rules :
(i) Articles purchased under — not according to specification or not in working order, *Stuart Menteth*, Note 2-4; *Taylor*, 1,588; *Baker*, 3,063 (3).
(ii) Delay caused by —, *Stuart Menteth*, Note 1-4, 197, *Harper*, 2,001; *Hutton*, 2,195 (1); *Nowroji*, 2,528 (1); *Wollaston*, 2,703; *Tillard*, 3,663, 3,679; *Hira Khan*, 4,015 (*c*).
(iii) Discouragement of branches of British manufacturing firms. *Stuart Menteth*, 186; *Cowley*, 1,397; *Taylor*, 1,573; *Meares*, 1,751; *Gavin Jones*, 4,069.
(iv) Discouragement of private enterprise, *Stuart Menteth*, 197; *Gill*, 435; *Lechmere-Oertel*, 1,680.
(v) Economy not secured by —, *Stuart Menteth*, Note 1, 2, 5-6; *Harper*, 2,009; *Gibson*, 2,996; *Bell* 4,246; *Keeling*, 4,749 (4), 4,761.

88. Stores rules—*contd.*
(vi) Firm supplying stores not responsible for safe arrival, *Stuart Menteth*, 197; *Nowroji*, 2,528 (2); *Bell*, 4,245.
(vii) Militate against maintenance of stocks in India, *Gill*, 430 · *Harper*, 2,016; *Fraser*, 2,456; *Clark*, 2,976; *Bombay Government*, (vi) (4), p. 326, Vol. II.
(viii) Unduly restrictive, *Framji*, 61 (c); *Wittet*, 121, 136; *Stuart Menteth*, 186; *Srinivasa Aiyengar*, 2,141 (11); *Nowroji*, 2,538; *Stanley*, 3,135; *Lishman*, 3,958; *Astbury*, 4,339; *Kanhaiya Lal*, 4,385 (22); *Yeoman*, 4,622 (2), 4,623 (*f*); *Budh Singh*. 4,722. 4,732; *Keeling*, 4,814; *Bombay Government*, (v) (7), p. 325, Vol. II.
See also Testing of plant.

89. Study leave :
(i) Advocated, *Vacha*, 1,100; *Kanhaiya Lal* 4,390, (3); *Budh Singh*, 4,728 (5), 4,740; *Punjab Government*, VIII, p. 314, Vol. III.

90. Sub-divisional officers :
DELEGATION OF POWERS TO —.
(i) Advocated, *Hansoti*, 353; *Advani*, 801 (3); *Mitra*, 1,323; *Hira Khan*, 4,026; *Kanhaiya Lal*, 4,388 (5) (*b*), 4.398, 4,401; *Dorman*, 4,703.
(ii) Opposed, *Thomson*, 886; *Dube*, 942; *Dey*, 1,458; *Zorab*, 1,782; *Wollaston*, 2,683.
(iii) Powers of payment restricted to petty items costing less than Rs. 10, *Hansoti*, 384; *Dey*, 1,458, 1,469; *Lechmere-Oertel*. 1,683; *Stanley*, 3,126.

91 Sub-heads :
See Accounts.

92. Superintending Engineers :
(i) Proposal to abolish, *Martindell*, 2,727; *Biggwither*, 2,842; *Hardiman*. 3,038; *Campbell*, 3,925.

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93. Technical sanction :
(i) Powers of officers to accord — should be increased, *Framji*, 61 (*c*), 83; *Stuart Menteth*, 189 (3); *Hansoti*, 353. 366; *Gebbie*, 419; *Advani*, 801(2); *Thomson*, 864-865; *Dube*, 933 (3) · *Desmond*, 991; *Abhyankar*, 1,165; *Kelkar*, 1,228; *Mitra*, 1,303 (2); *Lechmere-Oertel*, 1,682; *Zorab*, 1,782; *Lacey*, 2,107; *Srinivasa Aiyengar* 2,166; *Srinivasa Ayyar*, 2,376 I (*c*); *Wollaston*, 2,684-2685; *Stanley*, 3,142; *Bishun Swarup*, 3,192; *Blaber*, 3,636; *Tillard*, 3,662, 3,694-3,695; *Verrieres*, 3,838; *Dorman*. 4,689 (5), 4,702; *Keeling*, 4,749 (3). 4,783; *Bombay Government*, (v) (2)-(3), p. 325, Vol. II; *United Provinces Government*, 8 (v) (2), p. 310, Vol. III; *Chief Commissioner, Delhi*, 10, p. 316, Vol. III.
(ii) Restrictions on powers of — necessitate unnecessary correspondece, *Zorab* . . . . 1,782.
(iii) Restrictions on powers of — permit local Governments to promote inefficients without risk, *Thomson*, 883

94. Technical schools :
INSEIN :
(i) Scope of —, *Morris*, 3,089 (2), 3,091, 3,097
(ii) Inadequate accommodation at — : *Morris* 3,102.
(iii) Relaxation in regard to age limit recommended, *Morris* 3,092, 3,103-3,104
PATNA :
(iv) Scope of —, *Walford*, 3,298, Annexure B.
(v) Inadequate workshop staff, *Walford* . 3,325

95. Tenders :
(i) Not sufficiently advertised, *Williams* (*W. H.*), 3,546; *Currie*, 4,671.
See also Contracts.

96. Testing of plant :
(i) Can be undertaken in India, *Stuart Menteth*, 197; *Lechmere-Oertel*. 1,680; *Meares*. 1,751; *Bell*, 4,245,

97. Tools and plant :
- (i) Powers of purchase of — unnecessarily restricted, *Mitra,* 1,323 ; *Yeoman* 4,623 (*a*) (*b*) ; *Bombay Government,* (v) (4), p. 325, Vol. II.

98. Treasury payments :
- (i) System of — of personal claims inconvenient, *Srinivasa Aiyengar* 2,154

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99. University :
- (i) Connection of engineering colleges with — of doubtful value, *Heaton,* 1,887 ; *Chatterton,* 4,903.

100. University degree :
- (i) Attractive to Indian students, *de la Fosse,* 3,898, 3,900. 3,903

101. Upper subordinates :
- (i) Prospects should be improved, *Desmond,* 992 ; *Vacha,* 1,092 ; *Mitra,* 1,301 (5), 1,314 ; *Lacey,* 2,079 (2) ; *Kanhaiya Lal,* 4,385 (9), 4,397.
- (ii) Large number of — employed in Madras, *Mullings* 2,582

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102. Workshops :
- (i) Maintenance of — by government in Madras, *Lacey,* 2,098 ; *Srinivasa Ayyar,* 2,375 I (*h*), 2,390, 2,395 ; *Keeling,* 4,762.
- (ii) Abolition of — at Roorkee, *Gavin Jones,* 4,047 (2)

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